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Studies on the Chironomid Species Collected on Ishigaki and Iriomote Islands, Southwestern Japan

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Abstract: Collections of adult chironomid midges were carried out by Suzuki at 3 localities on Ishigaki Island for 2 days on June 30 and July 1, and at 2 localities on Iriomote Island on July 3, 1999, by sweeping with insect net during daytime and also by using a light trap during night time. Samples of larval and pupal chironomids in rivers and streams were also collected, and the adult midges were reared in the laboratory. The specimens were mounted individually on slides with gum-chloral medium and sent to Sasa for species identification and descriptions. As the results, 21 adult male specimens were obtained from Ishigaki, and they were classified into 12 species, among which only 2 were the previously described species from Europe and also from the mainland of Japan, and other 10 were new species. From Iriomote Island, 47 specimens were obtained and were classified into 21 species, and only 1 among them were in common with the Oriental Region and the mainland of Japan, and the rest 20 were new species. Only 1 species was in common to both islands. These 32 species are classified into 19 genera, and 5 among them are described as new genera, and one was a new genus to Japan.

Key words: Chironomidae, medical entomology, new species, new genus, Yaeyama Islands

INTRODUCTION

Ishigaki and Iriomote are the two main islands of Yaeyama located in the subtropical region in southmost part of Japan, between Taiwan and the mainland of China, and have been noted by the distribution of some peculiar plants and animals different from other regions of Southeast Asia. Collections of adult chironomid midges were carried out by Suzuki at three localities on Ishigaki Island on June 30, 1999, by sweeping at the side of Naguragawa River (# 1), on July 1 on the slope of Omotodake Mountain (#2), and on Iriomote Island in the town of Funeuki with a light trap (# 5), and by sweeping at the side of Kuira River (# 6) on July 3, 1999.

As the results, a total of 21 adult male specimens were obtained from Ishigaki Island, and they were classified into 12 species of Chironomidae, among which only 2 are those

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already recorded from Japan and Europe, and the rest 10 were new species. A total of 47 specimens were obtained also from Iriomote Island, and are classified into 21 species, among which only one species is in common with the mainland of Japan and also the southern Pacific Region, and the rest 20 are described as new species. It is a really surprising fact that such high percentages of the chironomid species collected from these two islands were the new species.

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MATERIALS AND METHODS

Four different methods were used from the collection of the chironomid specimens on these island, (1) daytime collection of adults resting in bushes by sweeping with insect net, (2) night collection of adult specimens with light traps, (3) night collection of adults being attracted on outdoor fluorescent lamps, and (4) collection of immature stages from fallen leaves in the rivers and streams. It has been demonstrated this time that fallen leaves in the streams collected in vinyl bags, and keeping them in the laboratory for about one month yield emergence of large numbers of adults, and is an efficient method for the collection of all stages of chironomid specimens.

The adult specimens thus collected were preserved in 70% ethanol solution in glass tubed, screened into species groups under stereomicroscope in petri dishes, and were individually mounted on slides in gum-chloral solution by the method described in the monograph of Japanese Chironomidae compiles by Sasa and Kikuchi (1995), and recently improved by Suzuki. The methods of standard measurements and nomenclature of the structures roughly followed the classic forms explained in the above monograph, and thus slightly different from the most recent forms used in the monograph edited by Wiederholm (1989).

Table 1. List of species collected on Ishigaki Island

1. *Dicrotendipes nervosus* (Staeger, 1839) (8M., 2F.)
No. 385:17–24, M., 385:25,26, F.
2. *Yaeprimus isigaabeus* gen. et sp. nov. (1 M) No.385:30 (Fig. 1)
3. *Polypedilum isigaabeum* sp. nov. (1 M) No. 385:01 (Fig. 2)
4. *Prochironomus irioheius* sp. nov. (1 M) No.385:29
5. *Tanytarsus isigacadeus* sp. nov. (6 M) No.385:02–07 (Fig. 3)
6. *Rheocricotopus chalybeatus* (Edwards, 1929) (1 M) No.385:16 (Fig. 4)

7. *Rheocricotopus isigadeus* sp. nov. (4 M) No.385:08–11 (Fig. 5)
8. *Eukiefferiella isigaefus* sp. nov. (3 M) No.385:13–15 (Fig. 6)
9. *Limnophyes isigafegus* sp. nov. (1 M) No.385:12 (Fig. 7)
10. *Limnophyes minimus* (Meigen, 1818) (1 M) No. 385:31
11. *Metriocenemus isigaheius* sp. nov. (2 M) No.385:27, 28 (Fig. 8)
12. *Corynoneura isigaijeus* sp. nov. (1 M) No. 385:32 (Fig. 9)

Table 2. List of species collected on Iriomote Island

1. *Chironomus samoensis* Edwards, 1929 (1 M) No.385:49
2. *Cryptotendipes irioabeus* sp. nov. (1 M) No.385:23
3. *Yaesecondus iriobeceus* gen. et sp. nov. (2 M) No. 385:50, 51 (Fig. 11)
4. *Microtendipes iriocedeus* sp. nov. (2 M) No. 385:34, 65 (Fig. 12)
5. *Pentapedilum iriodeeum* sp. nov. (2 M) No.385:61, 62 (Fig. 13)
6. *Pentapedilum uncinatum* Goetghebuer, 1921 (1 M) No.385:63 (Fig. 14)
7. *Polypedilum benokiense* Sasa et Hasegawa, 1988 (8 M, 10 F, 1 P)
No. 385:91–99, 386:11–22 (Fig. 27)
8. *Polypedilum iriofegeum* sp. nov. (14 M) No.385:72–85 (Fig. 15)
9. *Polypedilum irioegeum* sp. nov. (1 M) No.385:36 (Fig. 16)
10. *Prochironomus irioheius* sp. nov. (6 M) No.385:40–43, 47,48 (Fig. 17)
11. *Stenochironomus irioijeus* sp. nov. (1 M) No. 385:100 (Fig. 18)
12. *Yaetertius iriojekeus* sp. nov. (2 M) No.385:44, 45 (Fig. 19)
13. *Yaequartus iriokeleus* sp. nov. (1 M) No.385:71 (Fig. 20)
14. *Tanytarsus iriolemeus* sp. nov. (2 M) No.385:35,37 (Fig. 21)
15. *Tanytarsus iriomeneus* sp. nov. (1 M) No.385:55 (Fig. 22)
16. *Tanytarsus irioneous* sp. nov. (4 M) No.385:52–54, 56 (Fig. 23)
17. *Tanytarsus irioopeus* sp. nov. (4 M) No.385:57–60 (Fig. 24)
18. *Limnophyes iriopequeus* sp. nov. (1 M) No.385:69 (Fig. 25)
19. *Yaequintus irioquereus* sp. nov. (1 M) No.385:39 (Fig. 26)

Key to new genera of Chironominae recorded

Four new genera and one genus new to Japan are recorded as members of the subfamily Chironominae in this paper. They are differentiated by the following key.

- 1- Antenna with 11 flagellar segments; anteppronotum united in the middle 2
- Antenna with 13 flagellar segments; anteppronotum widely separated; squama bare 3
- 2- Anteppronotum with 1;1 lateral seta; squama bare; terminal comb scales of middle and hind tibiae with one long spur; dorsal appendage with one basal, and 2 inner setae

Yaeprimus gen. nov.

- Anteppronotum without setae; squama fringed with 5 or 6 setae; terminal comb scales of mid and hind tibiae with two spurs; dorsal appendage without seta; anal point stout, gonostylus very wide, nearly globular

No.50,51

Yaesecondus gen. nov.

- 3- Terminal comb scales of mid and hind tibiae with only one spur; No.44, 45
Yaetertius gen. nov.
- Terminal comb scales of mid and hind tibiae with two spurs 4
- 4- Gonocoxite with 3 processes, dorsal, median and ventral; wing with two dark marks
 No.40 *Prochironomus*
- Gonocoxite with 2 processes, dorsal and ventral; wing without dark marks No.71
Yaequartus gen. nov.

Part 1. Notes on the species collected on Ishigaki Island

1. *Dicrotendipes nervosus* (Staeger, 1839)

Eight males and 2 females were collected by sweeping at Omotodake on July 1. Males: No.385:17024 (#2:1:1-8). Females: No.385:25, 26 (#2:1:9-10). This is a species widely distributed in the Palaearctic Region, and has been collected also from at least 4 localities in the mainland of Japan (Sasa & Kikuchi, 1995, p.28).

Yaeprimus gen. nov.

A new genus belonging to Chironominae. Antenna with 11 flagellar segments, eyes bare and $ER < 1.0$, antepronotum narrowly united and with 1:1 lateral seta, wing membrane unmarked and bare, squama bare, VR much larger than 1.0, terminal combs of mid and hind tibiae with only one long spur, anal point small and parallel-sided, and dorsal appendage is free from microtrichia, long, narrow and apically rounded, with one basal and 2 inner setae. At present, only the following new species belongs to this genus. Differentiating points with other previously known genera are shown in the remarks of this new species.

2. *Yaeprimus isigaabeus* sp. nov. (Figs. 1 a-m)

A male was collected by sweeping on Mount Omotodake on July 1. Holotype. No.385:30 (#2:4). BL 2.44 mm, WL 1.12 mm, WW/WL 0.32. Scutum, postnotum and abdominal tergites almost uniformly brown, scutellum brownish yellow, legs yellow. Head in Fig. 1 a. Eyes bare, ER 0.54. Antenna with 11 (not 13) flagellar segments, AR 1.23, AHR 0.52. P/H 1.02. SO 7:7, CL 9. Antepronotum (Fig. 1 b) narrowly united, with 1:1 lateral seta. Scutum and scutellum in Fig. 1 c; DM 6, DL 7:6, PA 2:2, SC only 3.

Wing (Fig. 1 d) bare, without dark marks. Squama bare (unusual), anal lobe obtuse. $R2+3$ separated, RR 0.41. VR 1.30 (very high), R/Cu 1.08. Tip of front tibia (Fig. 1 e) with a long, narrow and sharply pointed terminal process. Terminal comb scales of middle and hind tibiae (Figs. 1 f,g) contiguous and with only one long spur (the *Polypedilum* type). fLR 2.09, mLR 0.69, hLR 0.77, fTR 0.37, fBR 2.6, mBR 5.0, hBR 4.8. Legs with small pulvilli (Fig. 1 h, front tarsus V).

Abdominal tergites (Fig. 1 i, Plate IV) with relatively small numbers of setae, 12 on I, 10 on II, 14 on III and IV, and 16 on V to VIII. Hypopygium as in Figs. 1 j (ventral) and k (dorsal view). Anal point bare, rather small, and tapering towards rounded apex. Dorsal appendage (also in Fig. 1 k) finger-like and slightly curved inwards, with one basal seta

directed backwards and two setae arising in the middle portion of inner margin and directed orally. Ventral appendage (also in Fig. 1 m) finger-like but tapered distally, with 7 recurved setae and one relatively short caudally directed apical seta. Gonostylus rather stout, with an unusually long terminal seta and 4 short setae along inner margin.

Remarks. This specimen belongs to the subfamily Chironominae in the basic structure, and related to the *Polypedilum* group in that one comb of middle and hind tibiae with a long spur and the other without spur, but is quite unusual in that squama is bare. Among genera of this group, it is most closely related to *Lauterborniella* Thienemann et Bause, 1913 in that wing bare and without dark marks, gonostylus is longer than gonocoxite, and anal point is bare, small and slender, but the known species of this genus, *L. agrayloides* (Kieffer) has 13 flagellar segments on antenna, dorsal appendage is thickly clothed with microtrichia except for the distal portion, and dorsal appendage is sickle-shaped, or inner margin concave and apically pointed.

3. *Polypedilum (Polypedilum) isigabeceum* sp. nov. (Figs. 2 a-j)

A male was collected by sweeping at the side of Nakura River on June 30. No.385:01 (#1-1). BL 2.96 mm, WL 1.20 mm, WW/WL 0.30. Scutum dark brown along midline and posterior portion between lateral stripes, other scutal areas yellow, scutellum, postnotum and abdominal tergites brown, legs yellow. Head in Fig. 2 a. Eyes bare, ER 0.44. Frontal tubercles (Fig. 2 b) long and conical, 23 μ m long, 7 μ m wide at the base, and 31 μ m apart from each other. Antenna with 13 flagellar segments, AR 1.65, AHR 0.49. P?H 1.00. SO 8:8, CL 16. Antepronotum (Fig. 2 b) separated, without setae. Setae on scutum and scutellum as in Fig. 2 c, DM 12, DL 7:8, PA 3:3, SC 5.

Wing (Fig. 2 d) bare, squama with 5:5 fringe hairs. R2+3 separated, RR 0.37, VR 1.28, R/Cu 1.12. Tip of fore tibia (Fig. 2 e) with broad and rounded terminal scale, tips of mid and hind tibiae (Figs. 2 f,g) with two terminal comb scales, one with a long spur, the other without spur. fLR 2.25, mLR 0.72, hLR 0.81 (all very high), fTR 0.40, fBR 3.0, mBR 6.9, hBR 8.6. Pulvilli present, brush-like, about half as long as the claws.

Hypopygium in Fig. 2 h. Anal point bare, long, narrow and nearly parallel-sided and apically rounded. Dorsal appendage (also in Fig. 2 i) long, narrow and nearly straight, only slightly expanded at base, with a long inner seta at base and a long lateral seta arising at 40% level from the base. Ventral appendage (Fig. 2 j) finger-like but rather stout, with 8 short recurved setae and a long, caudally directed seta on apical portion. Gonostylus long, narrow and widest at about middle.

Remarks. This specimen belongs to the *nubeculosum* group of subgenus *Polypedilum*, since dorsal appendage with lateral seta on the distal horn. It is somewhat related to *P. albicorne* (Meigen) among the European species, in that AR is smaller than 1.7, abdominal tergites are uniformly brown, dorsal appendage is long, narrow and nearly straight, and gonostylus is slender, but essentially different from it in coloration of scutum and in the position of lateral seta on dorsal appendage. Among the species of this group recorded from Japan, it is somewhat related to *P. kyotoense* (Tokunaga, 1938), in that scutal stripes are paler

than in the areas between them, and in the value of AR being about 1.7, but *P. kyotoense* differs from the present species in that scutum with dark areas also between median and lateral stripes, abdominal tergites II to VI each with a pair of large pale areas, fLR is 1.53-1.76 and smaller, and lateral seta of dorsal appendage arising from near the base.

5. *Tanytarsus isigacedeus* sp. nov. (Figs. 3 a-q)

Six males were collected by sweeping at the side of Nakura River on June 30. No.385:02-07 (#1:2:1-6). Holotype: 385:02. Paratypes: other 5 specimens. BL 2.08-2.46 (2.29 in average of 6) mm, WL 1.10-1.21 (1.16) mm, WW/WL 0.29 in 3, 0.30 in 3 specimens. Scutal stripes and postnotum brownish yellow, other scutal areas, scutellum, abdomen and legs pale yellow. Head in Fig. 3 a. Eyes bare, widely separated, ER 1.38-1.47 (1.43). Antenna with 13 flagellar segments, AR 0.65-0.72 (0.69), AHR 0.42-0.46 (0.44). P/H 1.08-1.18 (1.14). SO 7-9 (7.5), CL 11-12 (11.7). Frontal tubercles (Fig. 3 b) prominent, 23 μ m high, 16 μ m wide at the base, and 45 μ m apart from each other in the holotype. Anteprepronotum (Fig. 3 c) widely separated, without seta. Scutum and scutellum in Fig. 3 d; DM 4, 5 or 6 (mean 5.0), DL 4-6 (5.3), both very small in the numbers. PA all 1, SC 2 in 5, 3 in 1, also very small.

Wing in Fig. 3 e. Membrane bare, with very small numbers of macrotrichia only in extremely tip area, a characteristic to this species. RRR 0.50-0.58 (0.55), VR 1.26-1.33 (1.30), R/Cu 1.04-1.06 (1.05). Tip of fore tibia (Fig. 3 f) with a very narrow and sharply pointed terminal process. Tips of mid and hind tibiae (Figs. 3 g,h) with 2 very narrow comb scales, both with a spur. fLR 2.28-2.37 (2.32, very high), mLR 0.54-0.59 (0.57), hLR 0.62-0.67 (0.64), fTR 0.35-0.37 (0.36), fBR 2.9-3.6 (3.3), mBR 3.3-5.6 (4.3), hBR 3.6-6.8 (5.0). Pulvilli absent.

Hypopygium in Figs. 3 i (dorsal), j (ventral view). Anal point (also in Fig. 3 k) long, narrow and triangular, sharply pointed apically, with 2 spine clusters, and 4 pairs of lateral setae and 5 short basal setae. Dorsal appendages (Figs. 3 m,n) roughly quadrangular, with 3 dorsal setae and 2 longer inner setae arising on a median process. Digitus (Figs. 3 m,n) very large, almost entirely extending beyond posterior margin of dorsal appendage, widest at base and with long apically rounded process, and with a long basal seta arising on a large tubercle. Median appendage (M in Fig. 3 p) long and with relatively long simple setae some extending beyond tip of ventral appendage. Ventral appendage (V in Figs. 3 p,q) stout, with 8 recurved setae. Gonostylus widest at about basal 1/3, with 8 short setae along inner margin.

Remarks. These specimens belong to the *yunosecundus* group of genus *Tanytarsus*, since anal point with lateral ridges and spine clusters, and median appendage is long and some setae extending beyond tip of ventral appendage, but quite unusual among the previously known species of this group in that wing with only very small numbers of macrotrichia, scutum with small numbers of setae, anal point is long and sharply pointed apically, dorsal appendage is rather small and with inner process bearing two setae, and digitus is extremely large and long.

6. *Rheocricotopus chalybeatus* (Edwards, 1929) (Fig. 4 a)

A male was collected by sweeping at the side of Nakura River on June 30. No.385:16

(#1:6). BL 2.16 mm, WL 1.04 mm, WW/WL 0.34. Scutal stripes and postnotum black, other body portions dark brown. Eyes pubescent, ER 1.79. Antenna with 13 flagellar segments, AR 0.89, AHR 0.47. P/H 1.00. SO 1+3, 1+3, CL 15. Anteprenotum narrowly united, with 3:3 lateral setae. Scutum with a pair of large humeral pits. DM 0, DL 12:11, PA 3:3, SC 6. SQ 6, 6, RR 0.58, VR 1.19, R/Cu 1.02. fLR 0.61, mLR 0.52, hLR 0.58, fTR 0.14, fBR 1.5, mBR 1.8, hBR 2.4. Hypopygium in Fig. 4 a. Anal point large, widest at base and tapering towards pointed apex, with lateral setae and almost entirely clothed with microtrichia. Inner lobe of gonocoxite double layered, the dorsal lobe acutely angulate, the ventral lobe broader and obtuse. Gonostylus rectangularly curved near apex, with acutely angulate preapical tooth.

Remarks. This species was described by Edwards (1929, p.331) from England as a common species by the generic name of *Spaniotoma* (*Trichocladus*) but no description was made on the antennal ratio and on the structure of male hypopygium. It was placed into the genus *Rheocricotopus* Thienemann by Lehmann, 1969. In Japan, it was recorded by Tokunaga (1938) from Osaka and Kyoto by the generic name used by Edwards (1929), and by the present generic name by Sasa and coworkers from 7 localities in Japan, including Ishigaki Island (Sasa & Kikuchi, 1995, p.58). The present specimen shows AR value of 0.89 and smaller than 1.12-1.15 of specimens collected from Lake Biwa, but is almost coincident in other measurement data and structure to those of the Japanese specimens.

7. *Rheocricotopus isigadeus* sp. nov. (Figs. 5 a-n)

Four males were collected by sweeping also at the side of Nakura River on June 30. Holotype: No.385:08 (#1:1:3:1). Paratypes: No.385:09-11 (#1:3:2-4). BL 2.41-2.61 (2.48 in average of 4) mm, WL 0.97-1.08 (1.04) mm, WW/WL 0.30-0.33 (0.32). Scutal stripes, postnotum and abdomen dark brown, scutellum and legs brown. Head in Fig. 5 a. Eyes pubescent, ER 1.45-1.69 (1.79). Antenna with 13 flagellar segments, AR 0.91-0.98 (0.96), AHR 0.47-0.57 (0.52). P/H 0.94-1.11 (1.00). SO composed of 1 inner and 2 or 3 (2.8) lateral groups, CL 14-19 (15.5). Anteprenotum (Fig. 5 b) tapering towards middle and slightly separated, with 1-4 (2.6, most frequently 3) lateral setae. Large humeral pits (HM in Fig. 5 c) present. DM all 0, DL 10-15 (13.0), PA 3, 4 or 5 (4.0), SC 6-10 (8.0).

Wing (Fig. 5 d) bare, membrane plain, SQ 5-8 (6.7), RR 0.54-0.61 (0.58), VR 1.12-1.15 (1.14), R/Cu 1.02-1.09 (1.06). Costa slightly extended beyond tip of R4+5. Cu2 nearly straight. Tip of fore tibia (Fig. 5 e) with a long spur, tip of mid tibia (Fig. 5 f) with two short spurs, tip of hind tibia (Figs. 5 g,h) with a long and a short spur, and a comb composed of 12 free spines. fLR 0.62-0.64 (0.63), mLR 0.50-0.56 (0.52), hLR 0.56-0.58 (0.57), fTR 0.13-0.15 (0.14), fBR 1.2-1.6 (1.4), mBR 1.7-2.2 (2.0), hBR 2.2-3.0 (2.4). All legs with a large brush-like pulvilli (Fig. 5 i, fore tarsus V).

Hypopygium in Fig. 5 j. Anal point (also in Fig. 5 k, ventral view) low, broad and rounded, with 4 pairs of marginal setae, and with a rounded ventral process, an unusual structure. Inner lobe of gonocoxite (Figs 5 m, dorsal; n, ventral view) double layered, the dorsal lobe free from microtrichia and acutely angulate, the ventral lobe thickly clothed with microtrichia, and both with short setae. Gonostylus widest near apex but not apically curved

and without preapical tooth.

Remarks. This species also belongs to the genus *Rheocricotopus*, but differs from the above species and all the previously known species of this genus in that anal point is broad and low, apically curved ventrally and with a rounded ventral process, and gonostylus is not apically curved and without preapical tooth.

8. *Eukiefferiella isigaeus* sp. nov. (Figs. 6 a-i)

Three males were collected by sweeping at the side of Nakura River on June 30. Holotype: No.385:13 (#1:5:1). Paratypes: No.385:14 (#1:5:2, 3). BL 1.86, 1.72, 1.72 mm, WL 0.84, 0.86, 0.86 mm, WW/WL 0.38, 0.35, 0.35 (very wide). Scutal stripes and postnotum brown, other scutal areas and scutellum yellow, abdominal tergites and legs brownish yellow. Head in Fig. 6 a. Eyes bare, reniform, ER 1.40, 1.59, 1.45. Antenna with 13 flagellar segments, AR 0.65, 0.56, 0.66, AHR 0.45, 0.41, 0.46. P/H 0.81, 0.80, 0.82. SO all 2, CL 10, 5, 9. Anteprepronotum (Fig. 6 b) narrowly united, with 2:2, 1:1, 1:1 lateral setae. Scutum and scutellum in Fig. 6 c; DM all 0, DL 4:4, 6:6, 6:7, PA 3:3, 2:2, 3:3, SC 4, 4, 5.

Wing in Fig. 6 d. Squama with 3:3, 1:2, 2:4 fringe hairs. R2+3 in contact with R4+5, VR 1.25, 1.12, 1.33, tip of R4+5 proximal to tip of Cul, R/Cu 0.89, 0.85, 0.89. Costa slightly extended beyond tip of R4+5. Cu2 nearly straight. Tip of fore tibia (Fig. 6 e) with a long spur, tip of mid tibia (Fig. 6 f) with 2 short spurs, tip of hind tibia (Fig. 6 g) with a long spur, and a comb composed of 12 free spines, the short spur is absent. fLR 0.75, 0.79, 0.77, mLR 0.45, 0.43, 0.45 (unusually small), hLR 0.53, 0.57, 0.50, fTR 0.20, 0.19, 0.22, fBR 2.3, 2.3, 2.0, mBR 2.8, 2.5, 1.9, hBR 2.8, 2.4, 3.3. Pulvilli absent.

Abdominal tergites (Fig. 6 h) with small numbers of setae, 8 on I to III, 6 on IV, 10 on V and VI, and 8 on VII and VIII in the holotype. Hypopygium in Fig. 6 i. Anal point absent, ninth tergite without long setae in the middle portion. Inner lobe of gonocoxite large and rounded, with short setae. Gonostylus long, slender, without preapical tooth.

Remarks. This species belongs to the *yasunoi* group of genus *Eukiefferiella* Thienemann as defined by Sasa and Kikuchi (1995), since wing vein R2+3 is in contact with R4+5, squama fringed, eyes bare, and anal point is absent. It is most closely related among the previously recorded species to *E. togaeuprimsa* Sasa et Okazawa, 1992, in that tip of R4+5 is proximal to tip of Cul (R/Cu < 1.0), DM is absent, and inner lobe of gonocoxite is single and rounded, but in *E. togaeuprimsa* AR is 0.36-0.44 and smaller, SO is 3-4 and larger, VR is 1.12-1.33 and smaller, the numbers of setae on abdominal tergites are much larger (22-24 on tergites I to IV, in Fig. 13g, p.173). inner lobe of gonocoxite is much broader, virga is present, and posterior margin of ninth tergite is concave medially.

9. *Limnophyes isigafegus* sp. nov. (Figs. 7 a-k)

A male was collected by sweeping at the side of Nakura River on June 30. Holotype: No.385:12 (#1:4). BL 1.90 mm, WL 0.80 mm, WW/WL 0.30. Scutal stripes and postnotum brown, other scutal areas and scutellum pale, abdominal tergites largely brown but with narrow pale bands along anterior and posterior margins, legs yellow. Head in Fig. 7 a. Eyes

bare, reniform, ER 1.22. Antenna with 13 flagellar segments, last segment very short, AR 0.28, AHR 0.28. P/H 1.03. SO 7:7, CL 9. Antep pronotum (Fig. 7 b) very narrowly united, with 3:3 lateral setae. Scutum and scutellum in Fig. 7 c. DM 16, DL 4:5, SC 6.

Wing (Fig. 7 d) bare but highly granular, squama bare. Costa extended much beyond tip of R4+5. RR 0.73, VR 1.39 (very high), R/Cu 1.03. Cu2 strongly curved. Tip of front tibia (Fig. 7 e) with a long spur, tip of middle tibia (Fig. 7 f) with 2 short spurs, tip of hind tibia (Fig. 7 g) with a long spur and a comb composed of 10 free spines, a short spur is absent. fLR 0.72, mLR 0.40 (very small), hLR 0.57 fTR 0.19, fBR 2.8, mBR 2.8, hBR 4.0. Legs with prominent pulvilli (Fig. 7 h, front tarsus V).

Abdominal tergites (Fig. 7 i) with relatively small numbers of setae, 10 on tergite I, 14 on II and III, 16 on IV, 22 on V, 18 on VI and VII, and 24 on VIII. Hypopygium in Fig. 7 j. Anal point (also in Fig. 7 k) robust, acutely angular and with 16 strong setae, situated in the middle of ninth tergite. Posterior margin of ninth tergite acutely produced in the middle. Inner lobes of gonocoxite (Fig. 7 m) broad and obtusely angulate, with 16 strong and short setae. Gonostylus widest at about middle, without preapical tooth. Virga absent.

Remarks. This species is provisionally placed into the genus *Limnophyes* Eaton, since wing membrane is highly granular, costa is extended, Cu2 strongly curved, and anal point is triangular, with short setae and situated in the middle of anal tergite. However, this species is quite unusual as a member of this genus in that squama is bare, antenna with 13 flagellar segments but last segment is very short with AR of 0.28, and inner lobe of gonocoxite is very broad and low, with 16 strong setae.

10. *Limnophyes minimus* (Meigen, 1818)

A male was collected by sweeping on Mount Omotodake on July 1. No.385:31 (#2:5). BL 1.36 mm, WL 0.68 mm, WW/WL 0.34. Scutal stripes and postnotum brown, other scutal areas, scutellum and legs yellowish brown. BL 1.36 mm, WL 0.68 mm, WW/WL 0.34. ER 1.35. Antenna with 10 flagellar segments, AR 0.83, AHR 0.51. P/H 0.71. SO 3:3, CL 12, PN 2:2, DM 0, DL 9:9. PA 5:5, SC 4, SQ 1:1, RR 0.43, VR 1.17, R/Cu 0.96, fLR 0.49, mLR 0.45, hLR 0.53, fTR 0.12, fBR 1.9, mBR 2.8, hBR 2.7. This is a species common in Europe, and has been recorded also from a number of localities in Japan.

11. *Metriocnemus isigageheus* sp. nov. (Figs. 8 a-j)

Two males were collected by sweeping on the slope of Mount Omotodake on July 1. Holotype: No.385:27 (#2:2:1) Paratype: No.385:28 (#2:2:2). BL 2.48, 2.18 mm, WL 0.98, 1.00 mm, WW/WL 0.32, 0.30. Scutal stripes and postnotum brownish yellow, other scutal areas and scutellum pale, abdominal tergites largely yellow and with pale bands along oral and caudal margins, legs yellow. Head in Fig. 8 a. Eyes bare, ER 0.50, 0.42. Antenna with 13 flagellar segments, AR 0.58, 0.53, AHR 0.43, 0.42. P/H 1.00, 0.85. SO 9:9. 10:10, CL 11, 12. Atepronotum (Fig. 8 b) very narrowly united, PN 4:5, 6:5. Scutum and scutellum in Fig. 8 c. DM 15, 16, DL 12:14, 12:12, PA all 4, SC 11, 10.

Wing (Fig 8 d) with numerous macrotrichia on entire membrane and on the principal

veins, SQ 4:4, 3:4. R2+3 in contact with R4+5 (unusual as a member of this genus), VR 1.16, 1.21, R/Cu 0.98, 0.96. Tip of fore tibia (Fig. 8 e) with a long spur, tip of mid tibia (Fig. 8 f) with 2 short spurs, tip of hind tibia (Fig. 8 g) with a long spur, and a comb composed of 10 free spines, the short spur absent. Tarsi I and II of mid and hind legs without terminal spurs. fLR .89, 0.92, mLR 0.57, 0.59, hLR 0.61, 0.62, fTR 0.15, 0.15, fBR 2.8, 3.1, mBR 2.7, 4.0, hBR 4.0, 3.7. Pulvilli vestigial.

Hypopygium in Fig. 8 h. Anal point large, basal half very wide basally and V-shaped, clothed with microtrichia, distal half bare and slightly tapered, with rounded apex, with 4 or 5 lateral setae on both sides. Inner lobe of gonocoxite (Fig. 8 j, dorsal view) double layered, dorsal lobe acutely angulate and with numerous short setae, the ventral lobe wider and clothed with microtrichia. Basal lobe (also in Fig. 8 i) broad and rounded, thickly clothed with microtrichia. Gonostylus slender, widest at about distal 1/3, without preapical tooth.

Remarks. This species is considered as belonging to the genus *Metriocnemus* v. d. Wulp, 1874, since eyes are bare, wing with macrotrichia, Cu2 nearly straight, costa is extending beyond tip of R4+5, and anal point is present, but is unusual in that antennal segments are 13 and not reduced but AR is very small (0.53, 0.58), the numbers of setae on head, thorax and squama are relatively small, wing vein R2+3 is almost in contact with R4+5 (usually ending closer to tip of R1 than to tip of R4+5 in *Metriocnemus*). Therefore, it is somewhat related to *M. ryutanus* Sasa et Hasegawa, 1988 collected on Okinawa Island, but in the latter AR is 0.94, and the numbers of setae on scutum are much larger (DM 20, DL 27, PA 8-11), and anal point is larger and strongly constricted in the middle. The present species is therefore related to the genus *Thienemannia* Kieffer as redefined by Saether (1985), but again differs from it in that eyes are bare.

12. *Corynoneura isigaheius* sp. nov. (Figs. 9 a-k)

A male was collected by sweeping on Mount Omotodake on July 1. Holotype: No.385:32 (#2:6). Very small, BL 0.82 mm, WL 0.40 mm, WW/WL 0.73 (very wide). Scutal stripes and postnotum brown, other scutal portions and scutellum pale, abdominal tergites I to IV pale, V to hypopygium brown, legs yellow. Head in Fig. 9 a. Eyes bare, oval, ER 1.26. Antenna with only 6 flagellar segments, last segment very short and oval, AR 0.26, last segment with 16 long apical setae. Palp very short, segments II to IV very short and oval, P/H extremely small, 0.52. Anteppronotum (Fig. 9 b) united, with 1:1 lateral seta. Scutum and scutellum in Fig. 9 c; DM 0, DL 6:5, PA 2:2, SC 2.

Wing (Fig. 9 d) bare, venation typical as a *Corynoneura* species, vein R thickened and united with M, Cu very long and Cu2 very short. Tip of fore tibia (Fig. 9 e) with a long terminal spur, tip of mid tibia (Fig. 9 f) with 2 terminal spurs, tip of hind tibia (Fig. 9 g) strongly expanded and with a long spur, and a comb composed of 14 long spines, short spur absent. fLR 0.49, mLR 0.61, hLR 0.48 (all unusual ratios). fTR 0.11, fBR 2.3, mBR 1.8, hBR 2.2. The contour of tarsi I to V of front (Fig. 9 h), mid (Fig. 9 i) and hind legs (Fig. 9 j, from tip of hind tibia) as in these figures, tarsi III and IV are short and cordiform, hind tarsus I with a row of spines.

Hypopygium in Fig. 9 k. Ninth tergite with a pair of peculiar sharply pointed processes in the middle. Anal point absent, gonocoxite without lobes. Gonostylus apically curved, without preapical tooth.

Remarks. This species is considered as belonging to the genus *Corynoneura* in view of the structures of head, wings, tips of tibiae and hypopygium, but is quite unusual in the structure of antennae composed of only 6 short segments and last segment has a group of large numbers of long setae, and palpi are very short, which have not been observed in the previously recorded species of this genus.

Part 2. Notes on species collected on Iriomote Island

1. *Chironomus samoensis* Edwards, 1929

A male was collected with a light trap at Funauki on July 3. No.385:49 (#5:1:1). This is a species commonly collected in Japan and the southeastern Oriental Region.

2. *Cryptotendipes irioabeus* sp. nov. (Figs. 10 a-k)

A male was collected by sweeping at the side of Kuira River on July 2. No.386:33 (#3:1). BL 3.80 mm, WL 1.51 mm, WW/WL 0.29. Scutal stripes and postnotum brownish yellow, other scutal portions, scutellum and abdomen yellow, legs entirely yellow. Head in Fig. 10 a. Frontal tubercles absent. Eyes bare, ER 0.22. Antenna with 11 flagellar segments, AR 1.46, AHR 0.61, AHR 0.061. P/H 1.11. SO 19:19, CL 17. Anteprenotum (Fig. 10 b) widely separated, with 6:4 lateral setae, quite characteristic to this species. Scutum and scutellum in Fig. 10 c. DM 13, DL 13:12, PA 4:, SC 12.

Wing (Fig. 10 d) bare, squama with only 2:1 fringe hairs, R2+3 separated and RR 0.43; VR 1.19, R/Cu 1.10. Tip of front tibia (Fig. 10 e) with a rounded terminal scale. Tips of middle and hind tibiae (Figs. 10 f,g) with two separated comb scales, both with a short spur. fLR 1.73, mLR 0.61, hLR 0.68, fTR 0.26, fBR 2.3, mBR 2.4, hBR 3.5. All legs with large brush-like pulvilli.

Hypopygium in Figs. 10 h, dorsal, i, ventral view. Anal point bare, long, narrow, and apically rounded. Ninth tergite with 16 short setae around base of anal point, Bands of ninth tergite united in the middle. Dorsal appendages (Figs. 10 j,k) finger-like and with two preapical setae. Ventral appendage absent.

Remarks. This specimen is structurally a member of the genus *Cryptotendipes* Lenz, 1941, of the *Harnischia* complex of the subfamily Chironominae, since dorsal appendage is long, rod-like and bearing a few subapical setae, ventral appendage is basent, and gonostylus is long, slightly incurved and without apical tooth. A key to 10 species so far recorded as members of this genus was given by Saether (1977), and two species have been described from Japan, *C. tamacutus* Sasa, 1983, and *C. oyabeprimus* Sasa *et al.*, 1988, but the present species differs from them at least in the structure and shape of anteprenotum, ninth tergite and dorsal appendage.

***Yaesecundus* gen. nov.**

A genus belonging to the *Chironomus* complex of the subfamily Chironominae. Antenna with 11 flagellar segments and most other structures are typical as a member of this complex, but differs from all the previously known genera of this group in that dorsal appendage is roughly oval and without setae, ventral appendage is very large and finger-like, bearing 4 basal setae and numerous short recurved setae on distal portion of inner side, and gonostylus is extremely wide, roughly oval in shape. The generic name is taken from the locality of collection, Yaeyama Islands, which include both Ishigaki and Iriomote.

3. *Yaesecundus iriobeceus* sp. nov. (Figs. 11 a-p)

Two males were collected with a light trap in the town of Funeuki on July 7. No.385:50, 51 (#5:1:2, 3). BL 4.38, 4.16 mm, WL 1.81, 2.04 mm, WW/WL 0.29, 0.28. Scutal stripes, postnotum and hypopygium brown, other thorax parts, abdomen and legs yellow. Head in Fig. 11 a. Small frontal tubercles present (Fig. 11 b). Eyes bare, ER 0.19, 0.20. Antenna with only 11 flagellar segments, AR 2.06, 2.06, AHR 0.59, 0.60. P/H 0.97, 0.99. SO 12:14, 16:17, CL 24, 22. Anteprenotum (Fig. 11 c) united, without setae. Scutum and scutellum in Fig. 11 d; DM 15, 16, DL 10:10, 12:13, PA all 5, SC 7, 10. Wing bare and without dark marks, venation in Fig. 11 e. SQ 6:5, 6:5. R2+3 slightly separated from R1, RR 0.32, 0.29, VR 1.14, 1.11, R/Cu 1.14, 1.14. Tip of front tibia (Fig. 11 f) with a broad and rounded terminal process. Tips of middle and hind tibiae (Figs. 11 g,h) with two comb scales, both with a spur. fLR 1.63, mLR 0.56, 0.56, hLR 0.63, fTR 0.32, fBR 2.7, mBR 3.1, 3.5, hBR 3.2.

Hypopygium in Figs. 11 i (dorsal), j (ventral view). Anal point very wide, widest at base and apically truncate, with 3 pairs of dorsal setae and 3 pairs of marginal setae on dorsal side (Fig. 11 k), with an inverted T-shaped ridge and 6 pairs of setae on ventral side (Fig. 11 m). Dorsal appendage (Fig. 11 n) rather small, 88 μ m long and 28 μ m wide, roughly oval and bearing no setae (quite unusual). Ventral appendage (Fig. 11 p) very large, finger-shaped, 220 μ m long and 40 μ m wide, with 3 basal setae on inner side and 24 short recurved setae on inner side of distal portion. Gonostylus very wide, roughly oval, 172 μ m wide and 108 μ m wide, with a small triangular apical spur, a quite unusual shape.

Remarks. This species belongs to the *Chironomus* complex of the subfamily Chironominae, since the general structure is typical as a member of this group and antenna with only 11 flagellar segments. It is related to the genus *Xenochironomus* Kieffer, in that anteprenotum is united, pulvilli is well developed, ventral appendage is long and with setae on distal half, and anal point is low and broad, but differs essentially from it in that antenna with only 11 flagellar segments and thus belongs to the *Chironomus* complex, dorsal appendage of gonocoxite is long, plate-like and without setae, and gonostylus is extremely wide. Therefore, a new genus is created in order to accept this new species.

4. *Microtendipes iriocedeus* sp. nov. (Figs. 12 a-n)

Two males were collected by sweeping at the side of Kuira River. Holotype: No.385:34

(#3:2) on July 2, and paratype: No.385:65 (#6:1) on July 3. BL 2.92, 3.22 mm, WL 1.42, 1.54 mm, WW/WL 0.31, 0.34. Lateral stripes and postnotum brown, other portions of scutum, scutellum, abdomen and legs yellow. Head in Fig. 12 a. Eyes bare, ER 0.26, 0.21. Antenna with 13 flagellar segments, AR 1.08, 1.22, AHR 0.50, 0.49. P/H 1.02, 1.09. SO 14:14, 12:12, CL 18, 18. Anteprenotum (Fig. 12 b) widely separated,, without seta. Scutum and scutellum in Fig. 12 c; DM 18, 25, DL 22:20, 28:30, PA 6:5, 7:6, SC 14, 18.

Wing (Fig. 12 d) bare, without dark marks, squama with 12:12, 14:13 fringe hairs, R2+3 in contact with R1, VR 1.28, 1.29, R/Cu 1.13, 1.15. Tip of fore tibia (Fig. 12 e) with a long, narrow and apically pointed terminal process. Tips of mid and hind tibiae (Figs. 12 f,g) with two comb scales, one with a long spur and the other without spur. Pulvilli present, brush-like. fLR 1.81, 1.75, mLR 0.57, 0.58, hLR 0.77, 0.79, fTR 0.26, 0.29, fBR 3.3, 3.7, mBR 5.4, 4.0, hBR 4.2, 6.2.

Oral or anterior margin of 8th abdominal segment is inverted V-shaped like in *Poly-pedilum* species, a character not seen in the previously known species of *Microtendipes*. Hypopygium in Fig. 12 h. Anal point (also in Fig. 12 i) bare, long, narrow and tapering towards pointed apex. Dorsal appendage (Figs. 12 j,k,m) somewhat sickle-shaped, apically hooked and pointed, with 1 or 2 inner setae arising at about basal 1/3, and with one lateral seta on both sides in No. 34 (Figs. 12 j,k) but lateral seta is absent on right side dorsal appendage in No. 65 (Fig. 12 m). Ventral appendage (Figs. 12 n,p,q) finger-like, with 10 or 11 recurved setae, and with a long caudally directed seta on right side in No.34 and on both sides in No. 65, but this long, caudally directed seta is absent in left side ventral appendage in No. 34 (Fig. 12 n), quite an unusual variation. Gonostylus slender, widest at about middle.

Remarks. This species is structurally a typical member of the genus *Microtendipes* Kieffer, 1915, but is quite unusual in that important variations are seen on dorsal and ventral appendages among the two specimens and even in the right and left sides. The oral margin of 8th abdominal segment is inverted V-shaped like in the species of *Poly-pedilum*, which has not been seen in the previously known species of *Microtendipes*. The variations in the presence or absence of lateral seta of dorsal appendages or apical seta of ventral appendages are also quite unusual.

5. *Pentapedilum iriodeeum* sp. nov. (Figs. 13 a-k)

Two males were collected with a light trap at Funeuki on July 3. No. 385:61 (#5:3:1), paratype. No.385:62 (#5:3:2), holotype. BL 2.28, 2.14 mm, WL 1.12, 1.12 mm, WW/WL 0.32, 0.32. Scutal stripes, postnotum and abdominal tergites brownish yellow, other scutal areas, scutellum and legs yellow. Head in Fig. 13 a. Eyes bare, ER 0.16, 0.13. Antenna with 13 flagellar segments, AR 0.98, 1.04, AHR 0.45, 0.40. P/H 1.02. Frontal tubercles (Fig. 13 b) very small, 6 μ m wide, 2 μ m high, and 6 μ m apart from each other in the holotype. SO 12:12, 11:10, CL 18, 18. Anteprenotum (Fig. 13 c) widely separated, without setae. Scutum and scutellum in Fig. 13 d; DM 15, 12, DL 16:15, 16:17, PA 4:4, 4:3, SC 12, 13.

Wing (Fig. 13 e) with macrotrichia on the veins R, R1, R4+5 and Cul, and also only a few on the extreme apical areas. SQ 6:4, 4:4, RR 0.22, 0.20, VR 1.17, 1.22, R/Cu 1.15, 1.17.

Tip of fore tibia (Fig. 13 f) with a broad and rounded terminal process, terminal combs of mid and hind tibiae (Figs. 13 g,h) contiguous and with only one spur. Front tarsi all lost, mLR 0.63, hLR 0.78, mBR 4.4, hBR 3.0.

Abdominal tergites with relatively large numbers of setae, 28 on I, 44 on II, 36 on III and IV, 32 on V and VI, and 28 on VII and VIII. Hypopygium in Fig. 13 i. Anal point stout, with lateral ridges but without setae and microtrichia. Ninth tergite with a group of 8 long setae near the base of anal point, and 11 short setae on posterior margin flanking anal point. Dorsal appendage (Fig. 13 j) elongate oval, largely clothed with microtrichia, and with one basal and 2 median setae, a quite unusual structure. Ventral appendage (Fig. 13 k) long, narrow, finger-like, with 6 short and recurved setae, and one caudally directed apical seta. Gonostylus long and slender, widest at about middle, with an apical seta and 7 short setae along inner margin.

Remarks. This basic structures of this species are the same as members of the genus *Polypedilum*, but is classified into *Pentapedilum* since it bears macrotrichia on veins and a few on distal portion of the wing membrane. The next species bears numerous macrotrichia on the wing, a more typical member of this genus. The occurrence of such a species with only a small numbers of macrotrichia supports the opinion to treat *Pentapedilum* as a subgenus of *Polypedilum*. The structure of dorsal appendage of this species is quite unusual as members of the *Polypedilum* group.

6. *Pentapedilum uncinatum* Goetghebuer, 1921 (Fig. 14 a)

A male was collected also with a light trap at Funeuki on July 3. No. 385:63 (#5:4). BL 2.29 mm, WL 1.14 mm, WW/WL 0.30. ER 0.15, AR 1.27, P/H 1.09. SO 11:10, CL 21. Frontal tubercles absent. PN 0:0, DM 15, DL 10:10, PA 5:4, SC 9. SQ 2:2, RR 0.35, VR 1.22, R/Cu 1.17. Tarsi all lost. The above measurement data and the structure of hypopygium are nearly the same as those described for *P. uncinatum* by Pinder (1978) with British specimens or by Sasa and Kikuchi (1986) with Japanese specimens, but the position where lateral seta of dorsal appendage arises is about the middle of distal blade in the present specimen (Fig. 14 a) and thus intermediate between that of *P. tritum* (in basal half) and *P. uncinatum* (at distal 1/3).

7. *Pentapedilum benokiense* Sasa et Hasegawa, 1988 (Fig. 27 a)

Eight males, 10 females and 1 pupal skin were obtained on July 3, by laboratory rearing of fallen leaves collected at the side of Kuira River. Males: No.386:01-08 (#8:1:16-23). Females: No.386:11-20 (#8:1:27-37). Pupal skin: No.386:21 (#8:1:38). This species was first described with specimens collected on Okinawa Island, and later also from Amami Island to Nagano, Toyama and Aomori, Honshu (Sasa & Kikuchi, p.37). The standard measurement data of a male (No.386:01) among the present specimens are: BL 2.92 mm, WL 1.28 mm, WW/WL 0.29, ER 0.20, AR 0.75, AHR 0.38, PH 1.02, PN 0:0, DM 21, DL 20:20, PA 5:5, SC 14, SQ 14:14, R2+3 in contact with R1, VR 1.40, R/Cu 1.13, fLR 1.90, mLR 0.60, hLR 0.75, fTR 0.30, fBR 3.1, mBR 3.2, hBR 5.5. Data of all of 8 specimens are WL 1.22-1.38

(1.28 in average of 8) mm, AR 0.64-0.82 (0.72), fLR 1.86-2.00 (1.93). Anal point long, narrow and slightly tapered towards apex. Dorsal appendage (Fig. 27 a) composed of a high and wide base bearing two inner setae near base, and a distal horn with a long lateral seta arising at about basal 1/4. Ventral appendage long, finger-like, bearing 10 recurved setae near the apex and a long caudally directed seta.

8. *Polypedilum iriofegeum* sp. nov. (Figs. 15 a-k)

Seven males, 3 females, 3 pupa and 2 larvae were collected by laboratory rearing of fallen leaves collected on July 3 from the stream of Kuira River. Males: No. 385:72-78 (#8:1:1-7), females 385:79-81 (#8:1:8-10), pupae No.385:82-84 (#8:1:11-13), larvae No.385:85, 86 (#8:1:14, 15). Holotype: male, No.385:74 Paratypes: other 6 males.

Male. BL 2.64-3.12 (2.89 in average of 7) mm, WL 1.22-1.46 (1.38) mm, WW/WL 0.32-0.35 (0.33). Scutum, postnotum and abdomen almost uniformly dark brown, scutellum brown, legs entirely yellow. Head in Fig. 15 a. Eyes bare, ER 0.13-0.20 (0.20). Antenna with 13 flagellar segments, AR 0.71-0.80 (0.75), AHR 0.42-0.48 (0.44). P/H 1.02-1.22 (1.14). SO 9-16 (12.6), CL 14-19 (16.7). Anteprepronotum (Fig. 15 b) tapering towards middle and widely separated with a groove, without setae. Scutum and scutellum in Fig. 15 c. DM 16-23, all relatively long. DL 15-27 (21.6), PA 4-6 (5.2), SC 12-20 (15.4).

Wing in Fig. 15 d. Membrane bare, colorless and plain. Squama with 11-14 (11.5) fringe hairs. R2+3 in contact with R1. VR 1.33-1.39 (1.37), R/Cu 1.11-1.16 (1.14). Tip of fore tibia (Fig. 15 e) with a sharply pointed terminal process. Tips of mid and hind tibiae (Figs. 15 f,g) with two separated comb scales, one with a long spur and the other without spur. fLR 1.89-2.16 (2.02), mLR 0.53-0.57 (0.55), hLR 0.70-0.79 (0.74), fTR 0.29-0.35 (0.31), fBR 2.5-3.4 (2.9), mBR 4.0-4.8 (4.2), hBR 4.5-7.8 (6.3). Pulvilli large, brush-like.

Hypopygium in Fig. 15 h. Anal point long, narrow, parallel-sided but apically pointed. Ninth tergite with 10 long setae in the middle portion, and 6 setae on both sides of anal point. Dorsal appendage composed of a large nearly quadrangular basal portion and a slightly curved distal horn, usually with 2 long inner setae near the base and one long lateral seta arising from about 1/3 from base at the angular corner but occasionally without lateral seta on one side (Fig. 15 i, left dorsal appendage of No.385:75), or with only one basal inner seta (Fig. 15 j, right dorsal appendage of No.385:75), or no lateral seta on both dorsal appendage (No.385:73). Ventral appendage (Fig. 15 k) as typical of this group of *Polypedilum*, long, finger-like and with 10 short recurved setae and one long apical seta. Gonostylus long and narrow, widest at about middle, with 4 very long setae, one long apical seta, and 4 short setae along inner margin.

Remarks. These specimens show structures typical as members of the subgenus *Polypedilum*, but is quite characteristic in the shape of dorsal appendage composed of a large quadrangular basal portion and a slightly curved distal horn. It is further quite unusual in that, among the 7 males examined, 5 have a lateral seta on both dorsal appendage, but No.73 has no lateral seta on both dorsal appendages, and No.75 has a lateral seta on right dorsal appendage but not on left dorsal appendage. Since all the other characters of the two speci-

mens are the same as the others, they are included as belonging to the same species. The presence or absence of lateral seta on dorsal appendage has been used for separating the *nubeculosum* group and the *nubifer* group among the subgenus, but the presence of such intermediate forms are especially surprising.

9. *Polypedilum irioegeum* sp. nov. (Figs. 16 a-m)

A male was collected by sweeping at the side of Kuira River on July 2. Holotype: No.385:36 (#3:3:2). BL 1.94 mm, WL 1.06 mm, WW/WL 0.32. Body almost entirely pale yellow, even scutal stripes and postnotum not discernible by color. Head in Fig. 16 a. Frontal tubercles absent. Eyes bare, ER 0.45. Antenna with 13 flagellar segments, AR 0.84, AHR 0.51. P/H 1.01. SO 10:10, CL 12. Atepronotum (Fig. 16 b) widely separated, without seta. Scutum and scutellum in Fig. 16 c; DM 12, DL 8:8, PA 3:4, SC 5.

Wing bare, venation in Fig. 16 d. Squama with 4:5 fringe hairs. R2+3 in contact with R1, VR 1.29, R/Cu 1.13. Tip of fore tibia (Fig. 16 e) with a broad and apically pointed terminal process. Tips of mid and hind tibiae (Figs. 16 f,g) with two comb scales, one with a long spur and the other without spur. fLR 2.20, mLR 0.53, hLR 0.74, fTR 0.33, fBR 4.8, mBR 4.6, hBR 6.4.

Hypopygium in Fig. 16 h. Anal point (also in Fig. 16 i) bare, long, narrow and apically rounded. Ninth tergite with 6 long setae in the middle portion and 4 short setae on both sides of anal point on posterior margin. Dorsal appendages (Figs. 16 j,k) composed of a rather narrow base bearing 3 long inner setae, and a long, narrow and nearly straight dorsal horn bearing a long lateral seta arising near the base. Ventral appendage (Fig. 16 m) long, narrow and finger-like, bearing only 5 recurved setae and a long caudally directed apical seta. Gonostylus slender, nearly straight, bearing 4 long inner setae and an apical seta.

Remarks. This specimen belongs to the *nubeculosum* group of subgenus *Polypedilum*, since dorsal appendage with a long lateral seta, and is closest to *P. kurobepallidum* Sasa et Okazawa, 1992, in that body almost entirely pale yellow, wing unmarked, and basal portion of dorsal appendage is almost as high as broad and bearing long inner setae, but in *P. kurobepallidum* distal horn of dorsal appendage is strongly curved (nearly straight in the present species), lateral seta is arising at about middle (near the base in the present species), AR is 0.94-0.96 and larger, and fLR is 1.78-1.88 and smaller (2.20 in the present species).

10. *Prochironomus irioheius* sp. nov. (Figs. 17 a-m)

A total of 7 males were collected, 1 by sweeping at Omotodake, Ishigaki, on July 1; No.385:29 (#2:3), and 6 by sweeping at Kuiragawa, Iriomote, on July 2; No.385:40-43 (3:6:1-4), 385:47, 48 (#4:2:1, 2). Holotype: No.385:43. Paratypes: other 6 males. BL 2.19-2.98 (2.61 in average of 7) mm, WL 0.95-1.24 (1.09) mm, WW/WL 0.30-0.33 (0.32). Scutal stripes and postnotum dark brown, other scutal areas and scutellum brown, abdominal tergites dark brown, gonocoxite and gonostylus of hypopygium yellow, femora brown, tibiae and tarsi yellow. Wing with a conspicuous dark areas, as in Fig. 17 d. Head in Fig. 17 a. Eyes bare, ER 0.29-0.44 (0.34). Antenna with 13 flagellar segments, AR 0.48-0.59 (0.53), AHR 0.34-0.51

(0.41). P/H 1.10-1.35 (1.27), SO 10-14 (13.1), CL 13-18 (16.3). Antepronotum (Fig. 17 b) tapering towards middle but very narrowly united, without lateral seta. Scutum and scutellum in Fig. 17 c. Scutum with a pair of small humeral pits. DM 8-13 (11.0), DL 9-14 (12.1), PA 2-4 (3.0), SC 8-16 (12.7).

Wing as in Fig. 17 d, venation as in the tribe Chironomini and not as in the tribe Tanytarsini, R-M is not parallel to the wing axis but forming about 45 degree angle to it. Squama bare, RR 0.50-0.65 (57.4), VR 1.24-1.33 (1.28), R/Cu 1.08-1.13 (1.10). Wing with two broad and conspicuous dark cross bands. Tip of front tibia (Fig. 17 e) with a broad and rounded terminal scale without a process. Tips of middle and hind tibiae (Figs. 17 f,g) with two low and broad comb scales, both with a spur, like in *Chironomus* species. fLR 1.14-1.22 (1.18, very low as a member of Chironominae), mLR 0.57-0.62 (0.60), hLR 0.59-0.65 (0.63), fTR 0.19-0.23 (0.20), fBR 2.6-3.2 (2.8), mBR 2.7-3.8 (3.0), hBR 2.8-4.4 (3.4). Pulvilli absent.

Hypopygium in Figs. 17 h (dorsal) and i (ventral view). Anal point (also in Fig. 17 j) long, parallel-sided and relatively narrow, bare and without lateral setae and microtrichia. Ninth tergite with acutely angulate posterior margin, with 5 or 6 setae on both sides of posterior margin and 6-8 long setae arising in the middle portion. Gonocoxite with three appendages. Dorsal appendage (Fig. 17 k) somewhat sickle-shaped, widest at base and inner margin concave, apically rounded, with 2 lateral and 2 or 3 inner setae all arising at the middle portion, basal seta absent. Median appendage (Fig. 17 m) short, with some 12 long, simple setae directed inwards. Ventral appendage (also in Fig. 17 m) long, finger-like, bearing 26 short recurved setae on distal half, but without caudally directed apical seta. Gonostylus long and slender, nearly parallel-sided and apically rounded, with 16 short setae on inner margin.

Remarks. The basic structure of this species is somewhat intermediate between the *Chironomus* complex and the *Polypedilum* complex, since antenna with 13 flagellar segments but terminal comb scales of mid and hind tibiae with two spurs and antepronotum is narrowly united in the middle, and is quite unusual in that AR is small (0.48-0.59), wing with two large dark marks, squama bare, pulvilli absent, and gonocoxite with dorsal, median and ventral appendages similar to that of the tribe Tanytarsini. Such combination of characters are quite similar to that of a species collected by Tokunaga (1940, p.302) at Sizyukei, Taiwan, and recorded by the name of *Chironomus (Prochironomus) bifascipennis*, but it differs from the present species in that AR is 0.91 (larger than in the present species), dorsal appendage is widest at about middle, and pointed and curved apically (widest at base and apically rounded in the present species), and thus the present species is described as a new species by raising his subgeneric name as a genus.

11. *Stenochironomus irioijeus* sp. nov. (Figs. 18 a-p)

A male emerged in the laboratory from fallen leaves collected at the side of Kuira River on August 8, together with a large number of *Polypedilum benokiense*. No.385:100 (#8-1-25). BL 3.96 mm, WL 1.66 mm, WW/WL 0.31. Body almost entirely pale yellow, even scutal stripes hardly discernible by color, but ninth tergite and anal point brown, apical end and both

proximal and apical ends of tibiae slightly brownish. Head in Fig. 18 a. Frontal tubercles absent. Eyes bare, ER 0.30. Antenna with 13 flagellar segments, AR 1.09, AHR 0.69. P/H 1.03. Anteprenotum (Fig. 18 b) widely separated, without setae. Scutum and scutellum in Fig. 18 c. DM 24, DL 16:16, PA 5:4, SC 20.

Wing (Fig. 18 d) bare, plain, without dark marks (unusual as a member of this genus), squama with 10:12 fringe hairs, R2+3 ending close to tip of R1, RR 0.16. VR 1.11, R/Cu 1.14. Tip of fore tibia (Fig. 18 e) with an apical scale of rounded margin. Tips of mid and hind tibiae (Figs. 18 f,g) with fused combs bearing two spurs. Pulvilli well developed, brush-like. fLR 1.95, mLR 0.53, hLR 0.74, fTR 0.33, fBR 2.8, mBR 3.3, hBR 6.7.

Hypopygium in Figs. 18 h,i. Anal point (also in Fig. 18 j) long, narrow, parallel-sided and bare. Dorsal appendages (Figs. 18 i, seen from ventral side of hypopygium; k, left; m, right) small, pad-like, each bearing 4 setae. Ventral appendages (Figs. 18 n, left; p, right) extremely long, narrow and straight, bearing one large apical spine, and a terminal seta. Gonostylus also very long and narrow, bearing an apical seta, and 3 long and 7 short setae on inner margin.

Remarks. This specimen shows structures typical as a member of genus *Stenochironomus* Kieffer, 1919, since antenna with 13 flagellar segments, anteprenotum widely separated and without setae, dorsal appendage is small and pad-like, and ventral appendage is extremely long and with a spine and a seta apically. Nearctic and Palaearctic species of this genus were reviewed by Borkent (1984). On the other hand, a total of 8 species were recorded from Japan as members of this genus, as shown in the key compiled by Sasa & Kikuchi (1995, p.120), but all of the Japanese species so far recorded have dark marks on the wing, and none has colorless wings such as in this species.

***Yaetertius* gen. nov.**

A new genus belonging to the *Polypedilum* complex of the subfamily Chironominae, antenna with 13 flagellar segments, ER<1.0, tip of fore tibia with a long, narrow terminal process and tips of mid and hind tibiae with two comb scales bearing one long spur, and can be differentiated from the previously known genera of this group by that anteprenotum widely separated and with one lateral seta, the numbers of setae on thorax and abdomen are very small, tarsi IV and V of mid legs are unusually short, the former cordiform, and all legs without pulvilli. Dorsal appendage sickle-shaped and with 2 basal setae but without lateral seta, and ventral appendage without long apical seta.

12. *Yaetertius iriojekeus* sp. nov. (Figs. 19 a-n)

Two males, No.385:44, 45 (#3:7:1, 2), and a female, No.385:46 (#4:1), were collected by sweeping at the side of Kuira River on July 2. Holotype: No.385:44. Paratype: No.385:45.

Male. BL 2.56, 2.52 mm, WL 1.18, 1.12 mm, WW/WL 0.33, 0.33. Thorax and abdomen almost uniformly brown, coxae brown, trochanters, femora, tibiae and tarsi yellow. Head in Fig. 19 a. Eyes bare, each with a dorsomedial extension, ER 0.72, 0.46. Antenna with 13 flagellar segments, AR 1.22, 1.11, AHR 0.52, 0.53. P/H 1.02. SO 7:7, 7:7, CL 12, 13. An-

tepronotum (fig. 19 b) widely separated, with 1:1 lateral seta. Scutum and scutellum in Fig. 19 c; DM 6, 6, DL 5:5, 6:6, PA 2:2, 2:2, SC 4, 5.

Wing (Fig. 19 d) bare, without dark marks. Squama bare. RR 0.46, 0.51, VR 1.29, 1.35, R/Cu 1.10, 1.10. Tip of fore tibiae (Fig. 19 e) with a long, narrow and apically pointed terminal process. Tip of mid and hind tibiae (Figs. 19 f,g) with a narrow and a broad comb scales, the former with a long spur, the latter without spur. fLR 2.38, mLR 0.69, 0.74, hLR 0.82, 0.83, fTR 0.40, fBR 3.3, mBR 7.8, 4.7, hBR 4.8, 4.2. Tarsi VI and V of fore and hind legs are relatively long, as usual, 304 and 132 μm long in the fore leg and 150 and 86 μm in the hind leg (Fig. 19 i), while that on the middle legs are very short, only 45 and 50 μm long, the former cordiform (Fig. 19 h), a very unusual character. Pulvilli absent (Figs. 19 h,i).

Abdominal tergites (Fig. 19 j) with relatively small numbers of setae, 14 on I, 12 on II, 14 on III to VI, and 12 on VII. Hypopygium in Fig. 19 k. Anal point bare, long, narrow and tapering towards rounded apex. Dorsal appendage (Fig. 19 m) sickle-shaped and apically pointed, with two long basal setae but without lateral seta. Ventral appendage (Fig. 19 n) finger-like, with 10 recurved setae but without a long apical seta. Median appendage absent. Gonostylus slender, widest at about middle, with a long apical seta, and 5 setae on inner margin.

Remarks. This species belongs to the *Polypedilum* complex of the subgenus Chironominae, since antenna with 13 flagellar segments and one comb scale of mid and hind tibiae with a long spur and the other without spur, and resembles to the genus *Lauterborniella* Thienemann et Bause, 1913, in that wing bare, without dark marks and squama bare, ventral appendage without long apical seta, but differs essentially from the known species of this genus in the structure of anal point, and both dorsal and ventral appendages. The present species is quite characteristic in that anteppronotum with one lateral seta, the numbers of setae on scutum, scutellum and abdomen are very small, pulvilli are absent and tarsi IV and V of middle legs are unusually short. Therefore, a new genus, *Yaeterius* is created in order to accept this species.

***Yaequartus* gen. nov.**

A new genus provisionally placed in the subfamily Chironominae, but is quite unusual in that fore tibiae with one, mid and hind tibiae with two long, simple terminal spurs. Gonocoxite with a simple horn-like dorsal appendage without setae, and without ventral appendages. Gonostylus shorter than gonocoxite, and situated parallel to body axis. Anteppronotum widely separated, with 3 or 4 lateral setae.

13. *Yaequartus iriokeleus* sp. nov. (Figs. 20 a-k)

A male was reared in the laboratory on July 13 from a collection of fallen leaves collected on the Kuira River on July 3. No.385:71 (#7:1). BL 3.68 mm, WL 1.60 mm, WW/WL 0.32. Head in Fig. 20 a. Eyes bare, without dorsomedial projection, ER 0.92. Antenna with 13 flagellar segments, AR 1.67, AHR 0.60. P/H 0.97. SO 26, 24, very many but all small, CL 22. Anteppronotum (Fig. 20 b) widely separated, with 3:4 lateral setae. Setae on scutum and

scutellum in Fig. 20 c. DM 0, DL 8:7, PA 2:2, SC 6.

Wing (Fig. 20 d) bare, plain and without dark marks. Squama bare. R2+3 in contact with R1. VR 1.29, R/Cu 1.06. Tip of fore tibia (Fig. 20 e) with one long (104 μ m) terminal spur, tips of mid and hind tibiae (Figs. 20 f,g) both with two terminal spurs (110 and 62 μ m, 106 and 44 μ m), skin of these spurs are contiguous to the tibiae and not separated like terminal spurs in species of Orthoclaadiinae. Both fore and hind tarsi lost, mLR 1.06, mBR 1.7. Mid tarsi without terminal spur, tarsi IV and V long, small pulvilli present (Fig. 20 h,, mid tarsus V).

Hypopygium in Fig. 20 i. Anal point (also in Fig. 20 j) long, bare, widest at base and tapering towards pointed apex. Ninth tergite with numerous short setae near base of anal point and along posterior margin. Gonocoxite with a simple, bare and finger-like dorsal appendage (Fig. 20 k), and with an area thickly clothed by short setae posterior to it, ventral appendage absent. Gonostylus widest at about basal 1/3, with an apical triangular process (this is not an independent process but is an extension of the same skin), and with 8 short setae along inner margin, the other setae are also very short.

Remarks. This species is provisionally place into the subfamily Chironominae, since gonostylus is fixed on gonocoxite in parallel axis to the body, and gonocoxite with only a bare simple dorsal appendage, but is quite unusual in the terminal structure of tibiae, fore tibia with one, mid and hind tibiae with two simple long terminal process, which is a structure not seen in other previously known species of this and other subfamilies of Chironomidae.

14. *Tanytarsus iriolemeus* sp. nov. (Figs. 21 a-n)

Two males were collected by sweeping at the side of Kuira River on July 2. Holotype: No.385:35 (#3:3:1). Paratype: No.385:37 (#3:3:3). BL 2.10, 2.12 mm, WL 0.98, 1.07 mm, WW/WL 0.31, 0.30. Body almost entirely pale yellow, even scutel stripes hardly discernible by color. Head in Fig. 21 a. Frontal tubercles (also in Fig. 21 b) prominent, 15 μ m long and 9 μ m wide at the base, 36 μ m apart from each other. Eyes bare, ER 0.71, 0.75. Antenna with 13 flagellar segments, AR 0.53, 0.50, AHR 0.35, 0.36. P/H 1.18, 0.91. SO 9:10, 9:9, CL 13, 12. Anteprenotum (Fig. 21 c) widely separated, without seta. Scutum and scutellum in Fig. 21 d; DM 16,14, DL 6:5, 7:7, PA 1:1, 2:1, SC 6, 5.

Wing (Fig. 21 e) bare, squama bare, with numerous macrotrichia on almost entire surface, RR 0.50, 0.55, VR 1.44, 1.35, R/Cu 1.05, 1.04. Tip of fore tibia (Fig. 21 f) with a narrow and pointed terminal process, tips of mid and hind tibiae (Figs. 21 g,h) with 2 comb scales, both with a spur. fLR 2.43, 2.94, mLR 0.61, 0.60, hLR 0.70, 0.71, fTR 0.37, 0.39, fBR 2.6, 2.6, mBR 4.8, 4.4, hBR 6.0, 5.8.

Hypopygium in Fig. 21 i. Anal point (also in Fig. 21 j) long, narrow, tapering towards pointed apex, with lateral ridges and two spine clusters between them, and 4 lateral setae on both sides. Dorsal appendage and digitus in Figs. 21 k, dorsal, m, ventral view. The former half-egg shaped but with a conspicuous process at inner corner, with 4 dorsal, 3 inner and 1 basal setae. Digitus long, apically curved and rounded. Median and ventral appendages in Fig. 21 n. The former short, with simple setae directed inwards; the latter finger-like, with

10 short recurved setae. Gonostylus long, slender, with 10 short setae along inner margin.

Remarks. This species belongs to the *mendax* group of genus *Tanytarsus*, since anal point with lateral ridges and spine clusters, and median appendage is short, and somewhat similar to *T. tamaduodecimatus* Sasa, 1983, in that body is almost entirely pale yellow, anal point is apically pointed, dorsal appendage half-egg shaped and with a small inner process, digitus is long, and fLR is 2.24-2.55, but *T. tamaduodecimatus* differs from the present species in that anal point is much wider at base and with 5 spine clusters (only 2 in the present species), digitus is much shorter, frontal tubercles smaller, and AR is 0.72-0.75 and larger.

15. *Tanytarsus iriomeneus* sp. nov. (Figs. 22 a-j)

A male, No.385:55 (#5:2:4), was collected with a light trap on July 3 in the sea-side town of Funauki, together with other 8 specimens of the same genus. BL 2.02 mm, WL 1.01 mm, WW/WL 0.34. Body entirely pale yellow, even scutal stripes cannot be differentiated by color. Head in Fig. 22 a. Frontal tubercles absent. Eyes bare, ER 0.58. Antenna with 13 flagellar segments, AR 0.43, AHR 0.33. P/H 1.07. SO 10:10, CL 12. Anteprenotum widely separated, without setae. Scutum and scutellum in Fig. 22 b; DM 16, DL 12:12, PA 3:3 (unusual as a member of *Tanytarsus*, in which usually 1:1), SC 6.

Wing (Fig. 22 c) with macrotrichia almost on entire surface and on the principal veins, squama bare, RR 0.42, VR 1.22, R/Cu 1.09. Tip of fore tibia (Fig. 22 d) with a long, narrow and sharply pointed terminal process. Tips of mid and hind tibiae (Figs. 22 e,f) with 2 narrow comb scales, both with a long spur. Fore tarsi lost. mLR 0.56, hLR 0.69, mBR 3.2, hBR 3.2. Pulvilli present, brush-like.

Hypopygium in Fig. 22 g. Anal point (also in Fig. 22 h) large, V-shaped, entirely clothed with microtrichia but without lateral ridges and spine clusters, with 6 lateral setae and 10 short basal setae. Dorsal appendage (Fig. 22 i) finger-like, with an apical hook, and 11 short setae. Median and ventral appendages in Fig. 22 j. The former less than half as long as the latter, apically forked, and covered with microtrichia on distal half but without setae; ventral appendage large, long, with 16 recurved setae on distal half. Gonostylus narrow, with 12 short setae along inner margin.

Remarks. This is a member of genus *Tanytarsus*, but differs from the other two species collected at the same time with a light trap in that anal point is present. It is quite unusual as a member of this genus in the anal point without lateral ridges and spine clusters and entirely clothed with microtrichia. Digitus is absent, and dorsal appendage with an apical hook, and 11 short setae. Median appendage is also unusual in that distally forked into two branches and setae are absent, and distal half is clothed with microtrichia. Ventral appendages are also unusual in that they bear short setae along inner margin of distal half.

16. *Tanytarsus irioneus* sp. nov. (Figs. 23 a-m)

Four males were collected with a light trap on July 3 at the seaside town of Funauki. Holotype: No.385:52 (#5:2:1). Paratypes: No.385:53, 54, 56 (#5:2:2, 3, 5). BL 1.86-2.32 (2.06 in average of 4) mm, WL 1.02-1.10 (1.06) mm, WW/WL 0.30-0.34 (0.32). Scutal stripes yellow,

other body portions nearly white. Head in Fig. 23 a. Eyes bare, ER 0.40-0.70 (0.61). Antenna with 13 flagellar segments, AR 0.45-0.54 (0.51), AHR 0.40-0.44 (0.42). P/H 1.02-1.15 (1.10). Frontal tubercles (Fig. 23 b) very small and low, 8 μm wide, 3 μm high, and 50 μm apart from each other. SO 8-13 (10.3), CL 11-17 (14.0). Anteprenotum (Fig. 23 c) widely separated, without seta. Scutum and scutellum in Fig. 23 d; DM 14-17 (16.0), DL 8-15 (11.3), PA 2-3 (2.9).

Wing (Fig. 23 e) with macrotrichia almost on entire surface, squama bare. RR 0.38-0.42 (0.40), VR 1.14-1.18 (1.16), R/Cu 1.11-1.14 (1.13). Tip of fore tibia (Fig. 23 f) with a long, narrow and sharply pointed terminal process. Tips of mid and hind tibiae (Figs. 23 g,h) with two separated comb scales, both with a spur. fLR 1.54-1.56 (1.55), mLR 0.47-0.54 (0.52), hLR 0.56-0.65 (0.59), fTR 0.25-0.29 (0.27), fBR 2.1-2.8 (2.5), mBR 2.8-3.9 (3.1), hBR 3.2-6.7 (4.4). Pulvilli present, brush-like.

Hypopygium in Fig. 23 i. Anal point absent, ninth tergite with a low, broad and rounded lobe in the middle, and 6 short setae near the posterior margin. Dorsal appendage (Figs. 23 j, dorsal; k, ventral view) egg-shaped, with 7 dorsal setae and with a digitus-like process on the ventral side bearing 3 short apical setae. Median and ventral appendages in Fig. 23 m; the former finger-like and rectangularly curved near the base, with numerous short setae on dorsal side of distal half; ventral appendage about twice as long as the former, with 12-14 setae from near base to the tip along inner margin. Gonostylus slender, widest near base and tapering towards pointed apex, with 10 short setae along inner margin.

Remarks. This and the next species belongs to the genus *Tanytarsus* in the basic structure, but is quite unusual in that anal point is absent, and thus seems to belong to the *boodlae* group defined by Sasa and Kikuchi (1995, p.135), which has been recorded from Japan by Tokunaga (1933) with 6 marine species collected from tide pools on the sea shore of Wakayama, the middle Honshu. This and the next species are obviously different from the above 6 species especially in the structure of hypopygium, and both are described as new species. Since these two species were collected with a light trap, it is highly possible that they have emerged from the nearby tide pools.

17. *Tanytarsus irioopeus* sp. nov. (Figs. 24 a-k)

Four males were collected with a light trap on July 3 in the town of Funauki. No.385:57-60 (#5:2:6-9). Holotype: No.385:60. Paratypes: other 3 specimens. BL 2.24-2.49 (2.36 in average of 4) mm, WL 1.09-1.20 (1.14) mm, WW/WL 0.32-0.33 (0.32). Scutal stripes and postnotum brownish yellow, other body portions almost entirely pale yellow. Head in Fig. 24 a. Eyes bare, ER 0.53-0.64 (0.50). Antenna with 13 flagellar segments, AR 0.48-0.56 (0.53), AHR 0.35-0.41 (0.38). P/H 1.10-1.20 (1.14). Frontal tubercles (Fig. 24 b) present but rather small, 5 μm long and 5 μm wide, 43 μm apart from each other in the holotype. SO 10-11 (10.4), CL 14-20 (17.8). Anteprenotum (Fig. 24 c) widely separated, without seta. Scutum and scutellum in Fig. 24 d; DM 20-24 (22.3), DL 12-17 (14.8), PA all 3, SC 11 in 1, 12 in 3 specimens.

Wing (Fig. 24 e) with macrotrichia on almost entire surface excepting the proximal half.

Squama bare, RR 0.36-0.56 (0.46), VR 1.15-1.22 (1.18), R/Cu 1.04-1.10 (1.08). Tip of fore tibia (Fig. 24 f) with a narrow and apically pointed terminal process. Tips of mid and hind tibiae (Figs. 24 g,h) with two comb scales, both with a spur. Pulvilli present, brush-like.

Hypopygium in Figs. 24 i,j. Anal point absent, but ninth tergite with a broad and semicircular lobe on posterior margin, bearing numerous short setae. Dorsal, median and ventral appendages of gonocoxite in Fig. 24 k. Dorsal appendage (D in Fig. 24 k) forked into two arms, the dorsal arm longer and with 6 setae on dorsal side, digitus absent. Median appendage (M in Fig. 24 k) finger-like, clothed with microtrichia on distal half. Ventral appendage (V in Fig. 24 k) very long, tapering towards pointed apex, with 18 short setae along inner margin distributed from near base to the tip. Gonostylus long and slender, widest near base, with 16 short setae along inner margin.

Remarks. This species also lacks in anal point and similar in the structures of appendages of gonocoxite to the previous species and is considered as belonging also to the *boodleae* group of genus *Tanytarsus*, but differs from it and also from 6 species recorded by Tokunaga (1933) in having a semicircular lobe on posterior margin of anal tergite, and in the shapes of the three appendages of gonocoxite.

18. *Limnophyes iriopequesus* sp. nov. (Figs. 25 a-j)

A male was collected by sweeping at the side of Kuira River on July 3. Holotype: No.385:69 (#6:3). BL 1.78 mm, WL 0.90, WW/WL 0.32. Scutal stripes and postnotum brown, other scutal areas, scutellum and abdominal tergites yellow, legs brownish yellow. Head in Fig. 25 a. Eyes bare, reniform, ER 0.79. Antenna with 12 (not 13) flagellar segments, AR 0.58, AHR 0.38. Palp very short, P/H 0.64. SO 7:7, CL 5. Anteprenotum (Fig. 25 b) very narrowly united in the middle, PN 2:1. Setae on scutum and scutellum in Fig. 25 c; DM 0, DL 6:6, PA 2:3, SC 2, all very small in the numbers.

Wing membrane granular, venation in Fig. 25 d. SQ 0:0, RR 0.51, VR 1.09, R/Cu 1.11. Costa not extended. Cu2 nearly straight. Anal lobe nearly flat. Tip of fore tibia (Fig. 25 e) with a spur, 49 μ m long. Tip of mid tibia (Figs. 25 f,g) with a long and a short spur, and a comb composed of 4 free spines. Tip of hind tibia (Figs. h,i) with a long and a short spur, and a comb composed of 10 free spines. Tips of mid and hind tarsus I and III without terminal spurs. fLR 0.73, mLR 0.47, hLR 0.63, fTR 0.14, fBR 2.1, mBR 2.5, hBR 3.0. Pulvilli absent.

Hypopygium in Fig. 25 j. Anal point absent, anal tergite with 10 setae in the middle portion, posterior margin produced forming a V-shape. Inner lobe of gonocoxite small, low and broadly rounded. Gonostylus widest near apex, inner margin curved inwards near apex, with a megaseta but without preapical tooth.

Remarks. This specimen is considered as belonging to the genus *Limnophyes* Eaton, 1875, since basic structures are typical as a member of Orthocladiinae, eyes are bare and reniform, wing membrane is granular, but is unusual in that antenna with only 12 flagellar segments, mid tibia with a long and a short spur and with a comb composed of 3 free spines, costa not extended beyond tip of R4+5, vein Cu2 is nearly straight, anal point and virga are

absent, and such a combination of structures has not been observed in the previously known species of this genus.

Genus *Yaequintus*, gen. nov.

A new genus belonging to the tribe Pentaneurini of the subfamily Tanypodinae, since antenna composed of 14 flagellar segments and the last segment is very short, wing almost entirely clothed with macrotrichia, cross vein MCu present and slightly distal to FCu, front tibia with one, mid and hind tibiae with two barbed terminal spurs, postnotum without setae, and gonocoxite without basal lobes. However, we cannot find a genus accepting this species, in which squama is bare, hind tibia with two simple spurs, anal point is absent and ninth tergite with a transverse row of 8 long setae, apodemes are simple V-shaped, and gonocoxite without basal lobes and without setigerous areas.

19. *Yaequintus irioquereus* sp. nov. (Figs. 26 a-h)

A male was collected by sweeping at the side of Kuira Rivor on July 2. Holotype: No. 385:39 (#:3:5). BL 2.74 mm, WL 1.34 mm, WW/WL 0.28. Scutal stripes, postnotum and abdomen brown, other scutal areas, scutellum and legs yellow. Head in Fig. 26 a. Eyes bare, ER 0.33. Antenna with 14 flagellar segments (including the short apical segment), AR 1.17. Palp long. P/H 1.66. SO 16:16, CL 16. Antepronotum (Fig. 26 b) widely separated, with 2:2 lateral setae. Scutum and scutellum in Fig. 26 c; DM 32, DL 26:26, PA 6:6, SC 24. Postnotum without long bristles.

Wing (Fig. 26 d) membrane almost entirely clothed with macrotrichia but without dark marks. Squama bare. Tip of costa not extended beyond tip of R4+5, which is much proximal to tip of M. Veins R1 and R4+5 are running very closely, and R2+3 is almost in contact with R4+5. R2+3 is not forked like in most other species of Tanypodinae. VR 0.91, R/Cu 1.07. M-Cu slightly distal to FCu. Tip of fore tibia (Fig. 26 e) with one barbed spur, tip of mid tibia (Fig. 26 f) with two barbed spurs, tip of hind tibia (Fig. 26 g) with two barbed spurs and two simple spines. fLR 0.70, mLR 0.71, hLR 0.80, fTR 0.25, fBR 3.4, mBR 3.8, hBR 4.0. Pulvilli absent.

Hypopygium in Fig. 26 h. Anal point absent. Anal tergite with a transverse row of 8 long setae, apodeme simple and V-shaped, conspicuously pigmented. Gonocoxite without appendages, with 5 long setae along inner margin, and 12 recurved setae on dorsal side. Gonostylus long and slender, without preapical tooth.

Remarks. This species has the wing vein MCu, and vein R2+3 is not forked but simple, and thus resembles to the species of the subfamily Diamesinae, but is considered as belonging to the subfamily Tanypodinae, since wing membrane is thickly clothed with macrotrichia, and antenna with 14 flagellar segments and last antennal segment is very short. With the key compiled by Pinder (1978) for differentiating genera of this subfamily, it comes out to genus *Paramerina* Fittkau, since tarsi IV are cylindrical, cross vein MCu is distal to FCu, postnotum bare, tibiae are unicolorous, gonocoxite without basal lobe, wing membrane unmarked, eyes are bare, costa ending proximal to tip of M and abdomen not banded, posterior tibia with two apical spurs and ninth tergite with distinct apodemes, but in mem-

bers of this genus squama is fringed, R2+3 is forked when present, apodemes of ninth tergite are not simple like in the present species, and hind tibial combs are not subequal in length but one is about twice as long as the other.

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Almost all the references to taxonomy and identification of adult males of Chironomidae recorded from Japan are listed in the two following monographs.

- 1) Sasa, M. & Kikuchi, M. (1995): Chironomidae of Japan, 333 pp. Univ. Tokyo Press.
- 2) Sasa, M. (1998): Chironomidae of Japan 1998, 156 pp. Res. Rep. Inst. Environ. & Welf. Stud. Kurobe

A monograph on the adult males of Chironomidae and their references are compiled in the following book.

- 3) Wiederholm, T. (Ed. 1989): Chironomidae of the Holarctic Region. Keys and Diagnoses. Entomologica Scandinavica. Suppl. 34, 532 pp.

An especially useful keys and illustrations are given in the following book.

- 4) Pinder, L.C.V. (1978): A key to adult males of British Chironomidae. Freshwater Biol. Assoc., Windermere, England

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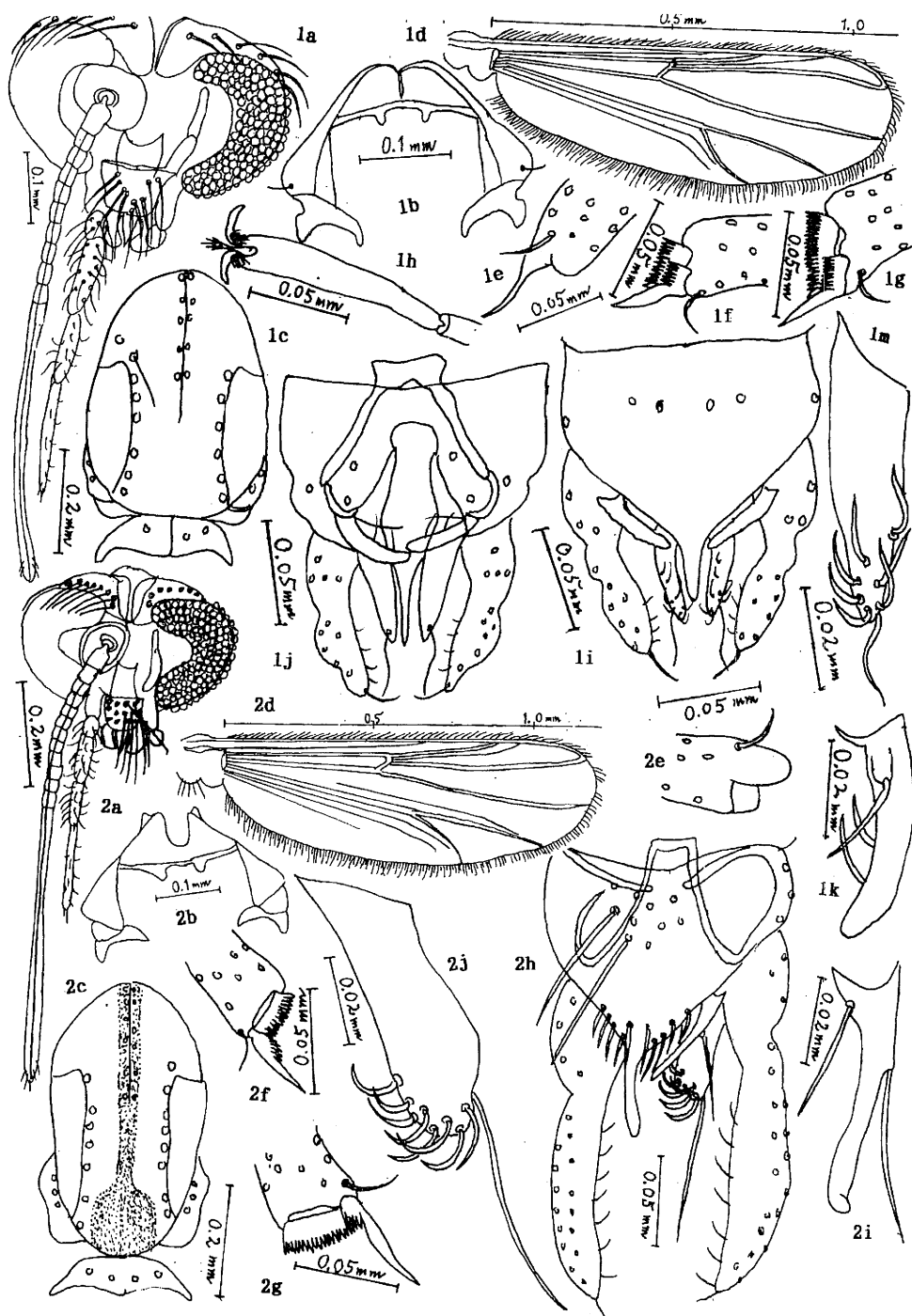


Plate I. Fig. 1. *Yaeprimus isigaabeus* gen. et sp. nov.

Fig. 2. *Polypedilum isigabeceum* sp. nov.

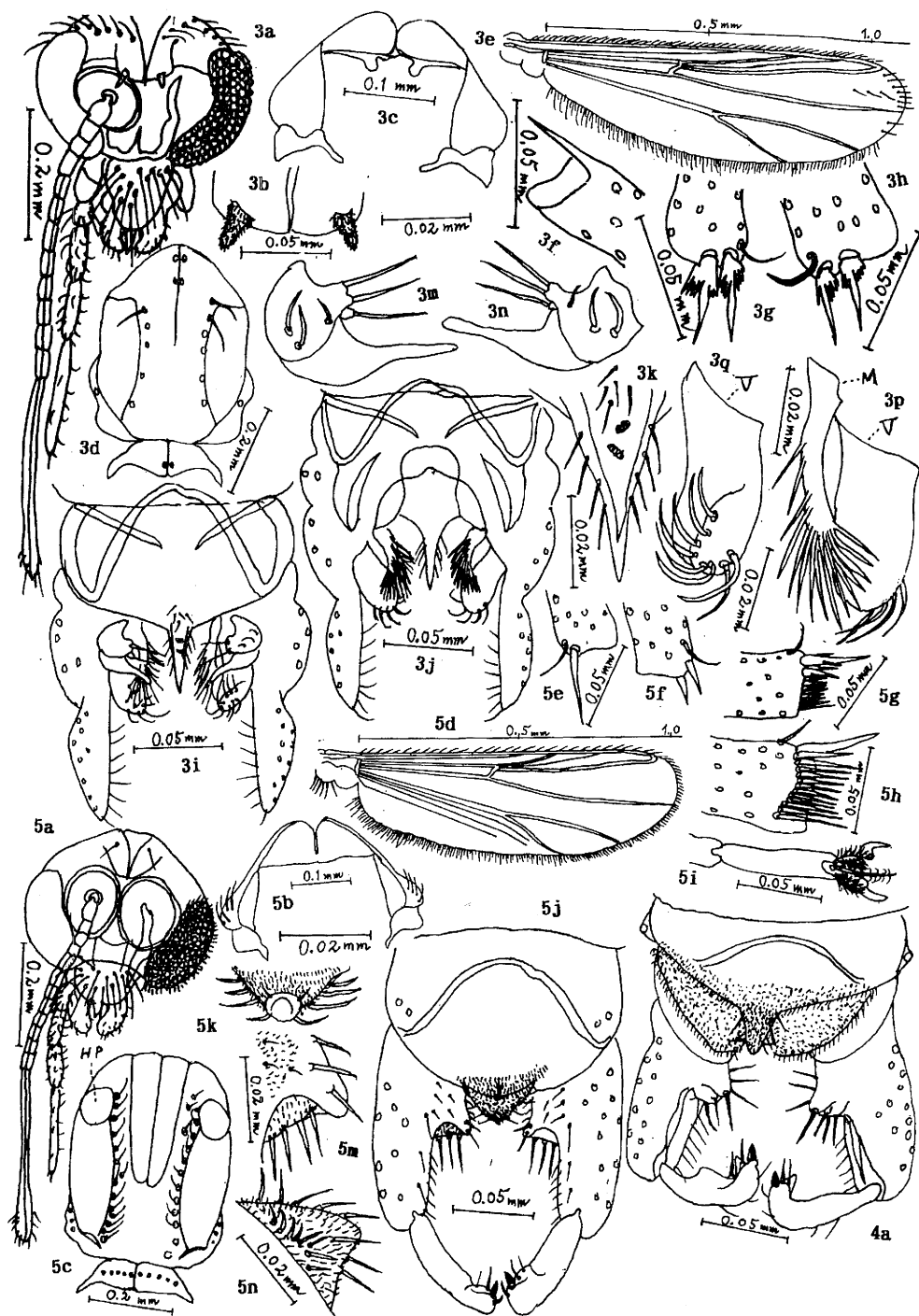


Plate II. Fig. 3. *Tanytarsus isigaceus* sp. nov.

Fig. 4. *Rheocricotopus chalybeatus* (Edwards, 1929)

Fig. 5. *Rheocricotopus isigadeus* sp. nov.

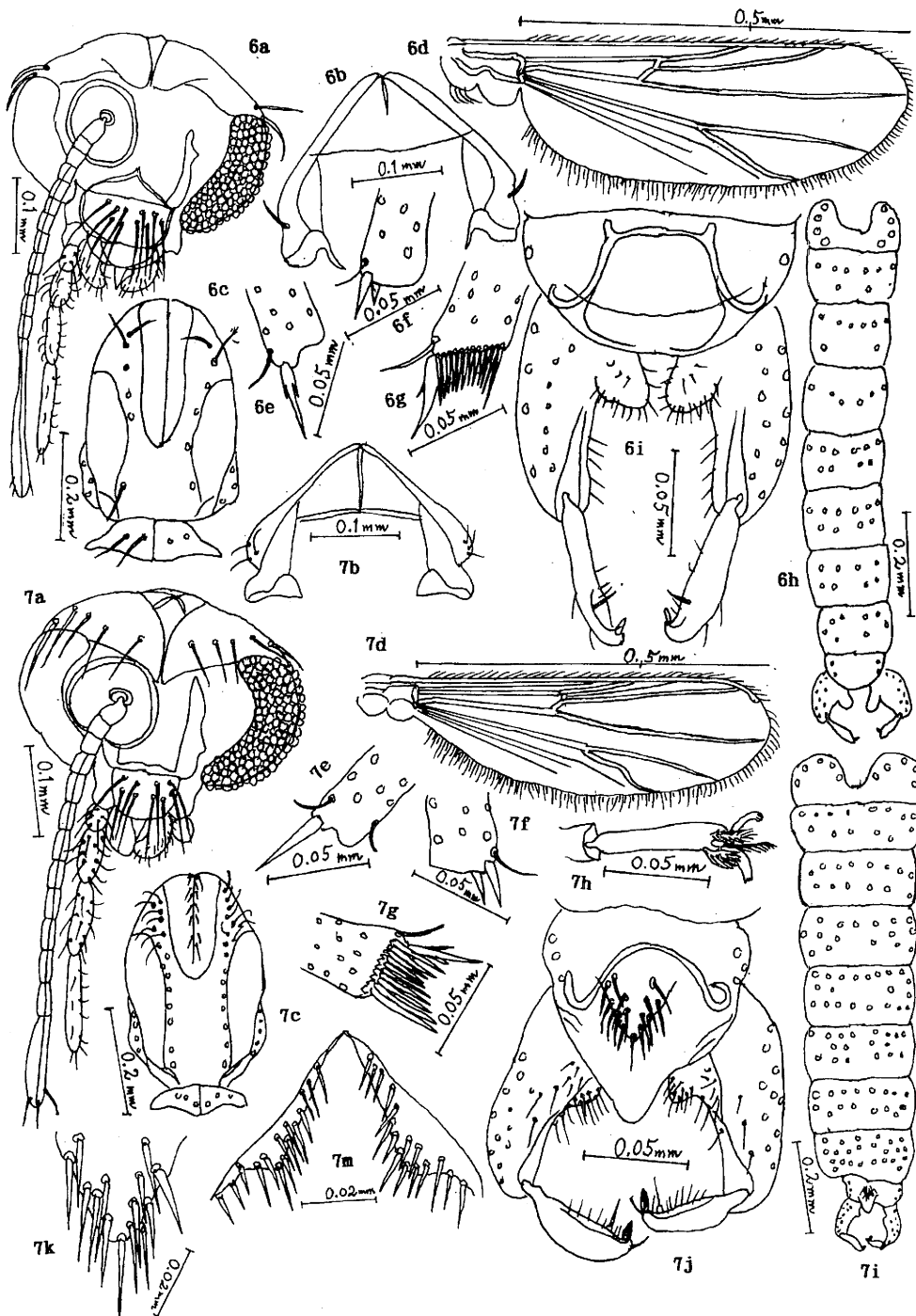


Plate III. Fig. 6. *Eukiefferiella isigaeus* sp. nov.

Fig. 7. *Limnophyes isigaeus* sp. nov.

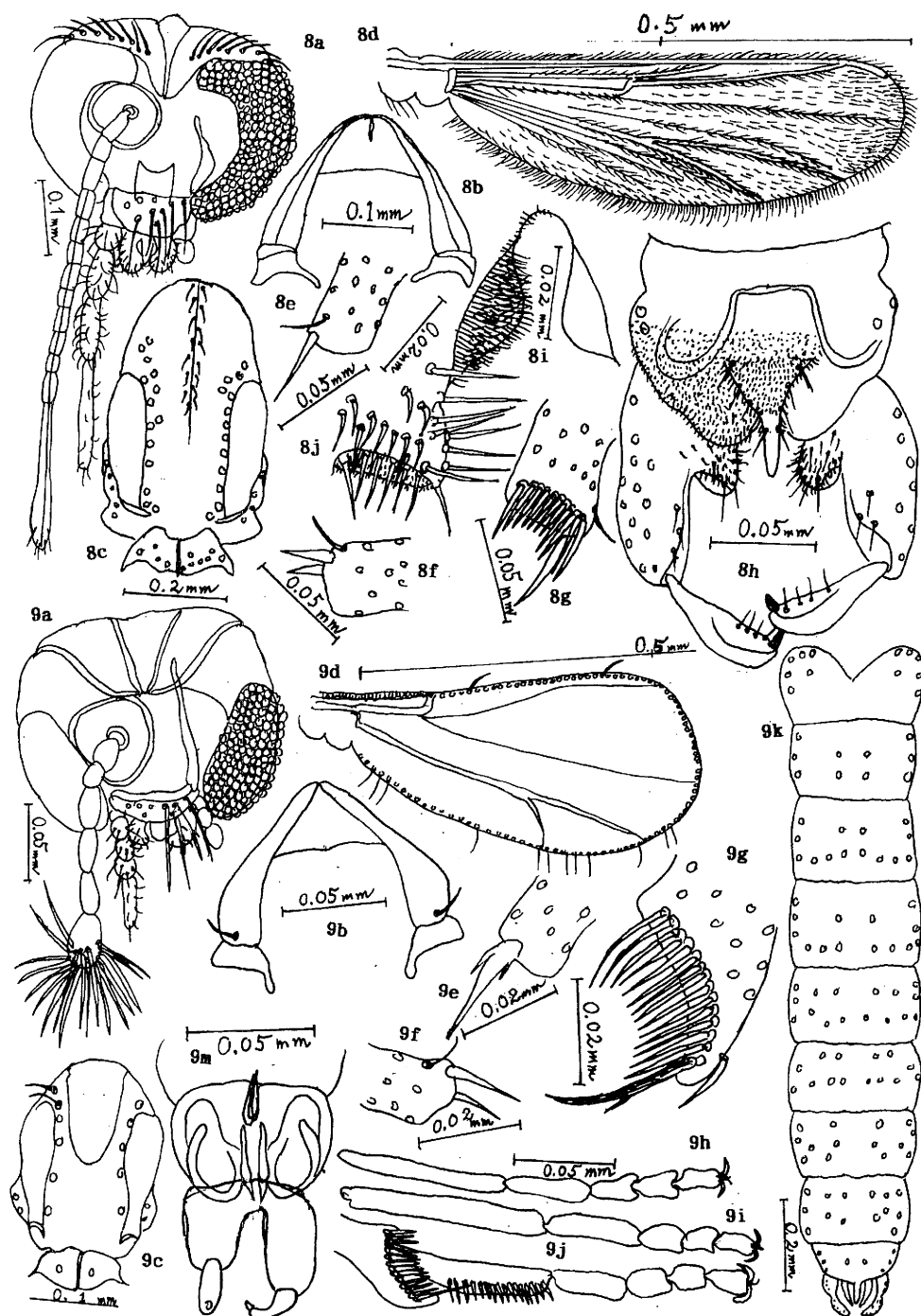
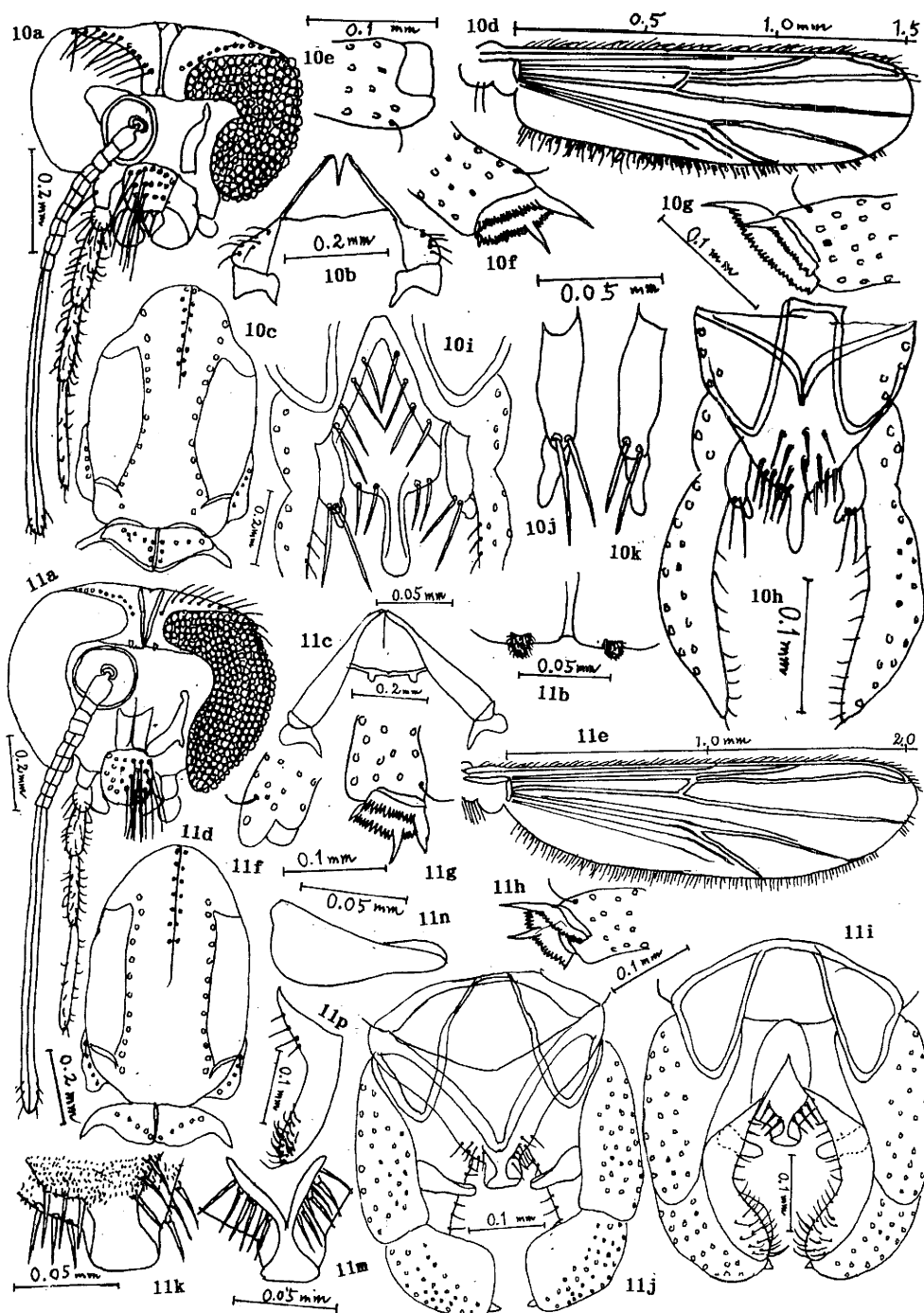


Plate V. Fig. 8. *Metriocnemus isigageheus* sp. nov.

Fig. 9. *Corynoneura isigageheus* sp. nov.



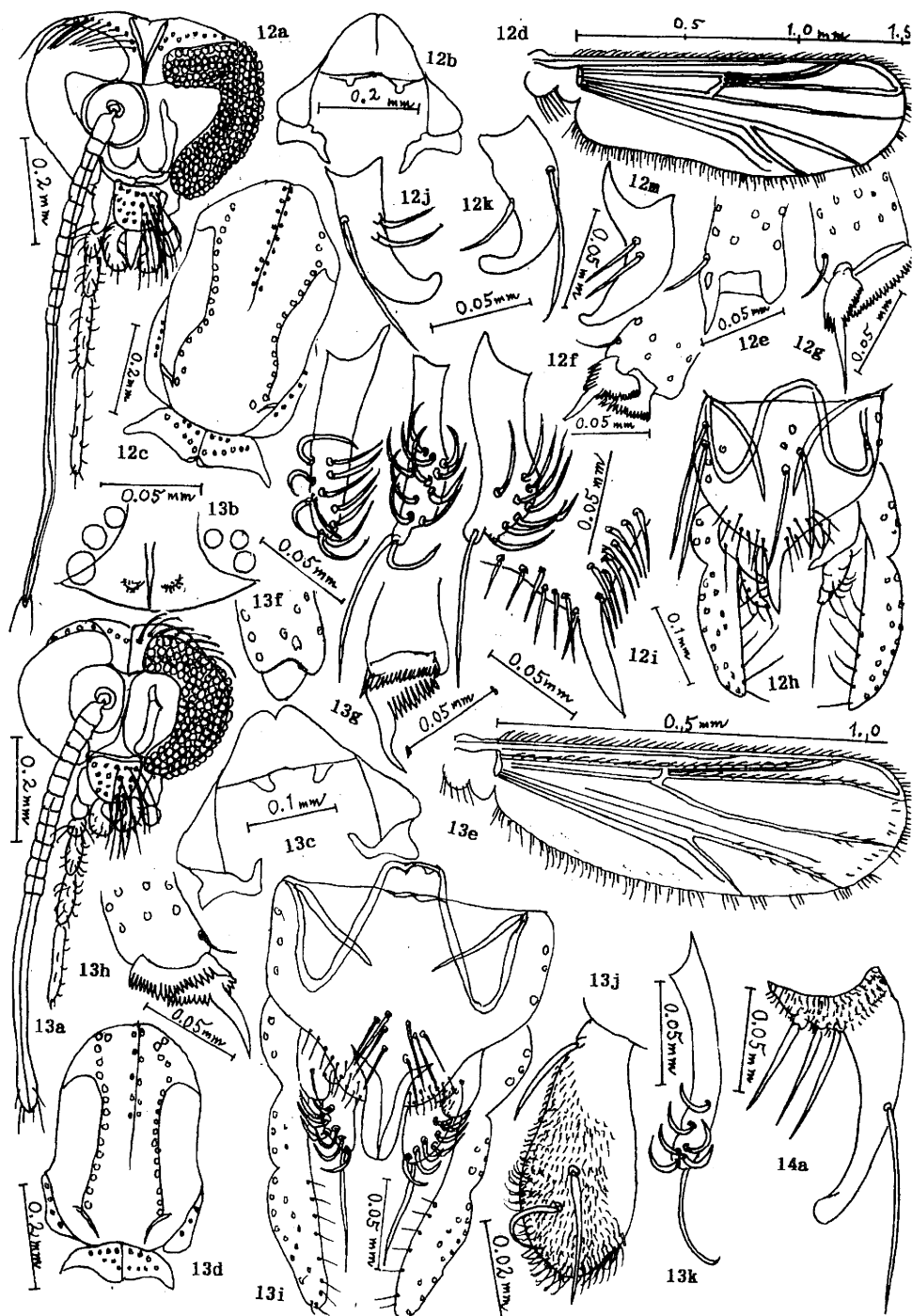


Plate VI. Fig. 12. *Microtendipes irioceseus* sp. nov.

Fig. 13. *Pentapedilum iriodeum* sp. nov.

Fig. 14. *Pentapedilum uncinatum* Goetghebuer, 1921

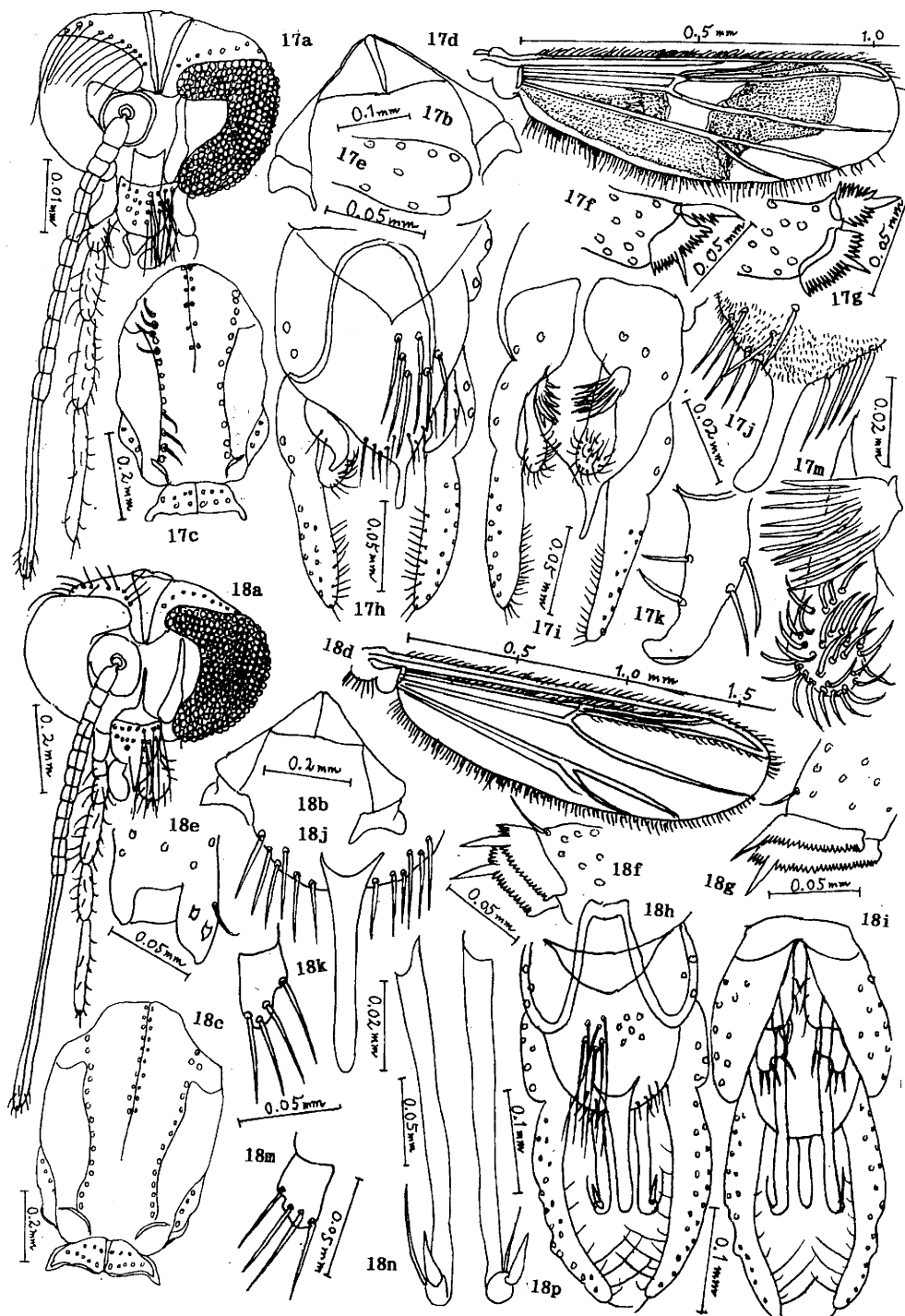


Plate VIII. Fig. 17. *Prochironomus irioheius* sp. nov.

Fig. 18. *Stenochironomus iriojeus* sp. nov.

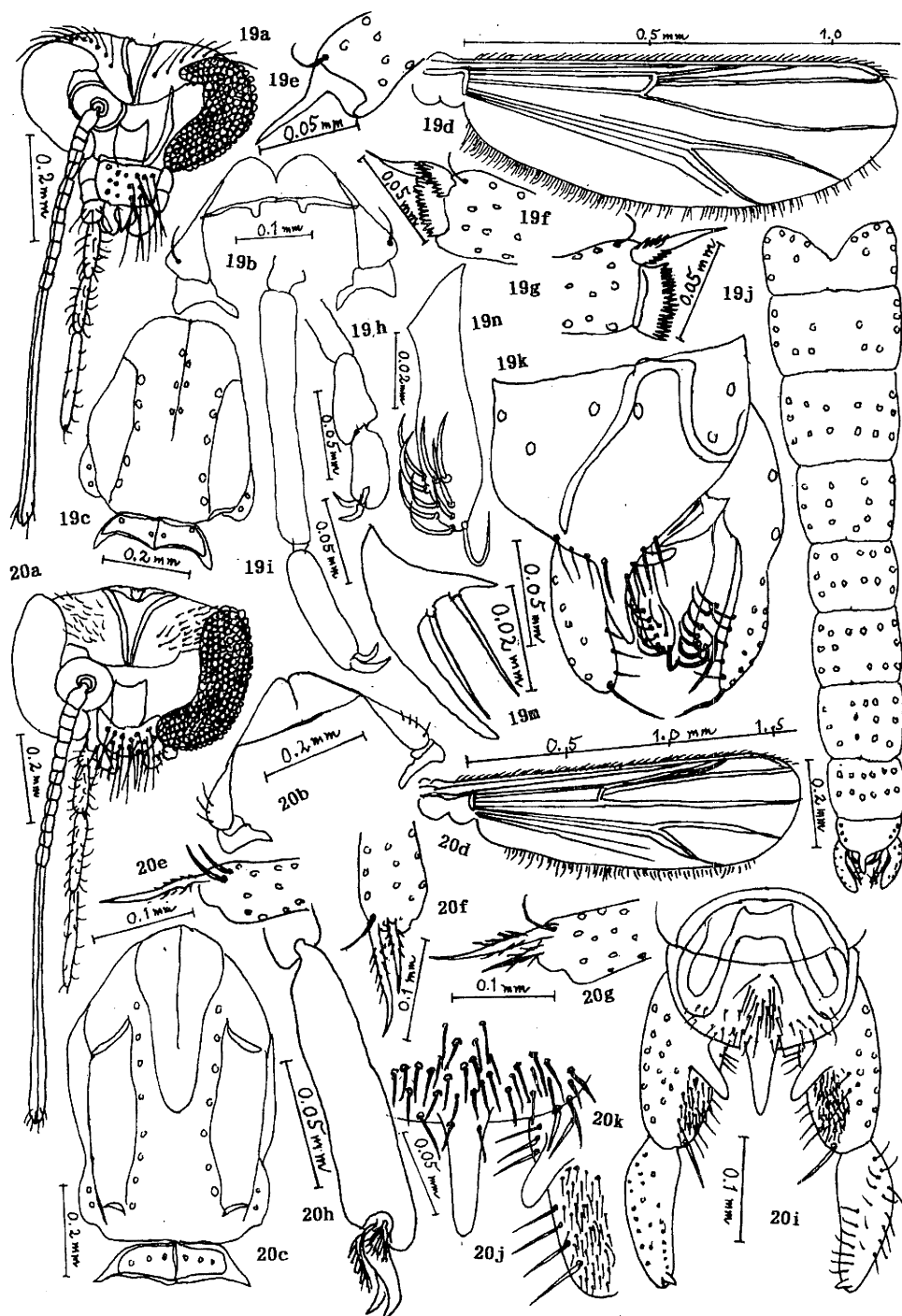


Plate X. Fig. 19. *Yaetertius iriojekeus* gen. et sp. nov.

Fig. 20. *Yaequartus iriokeleus* gen. et sp. nov.

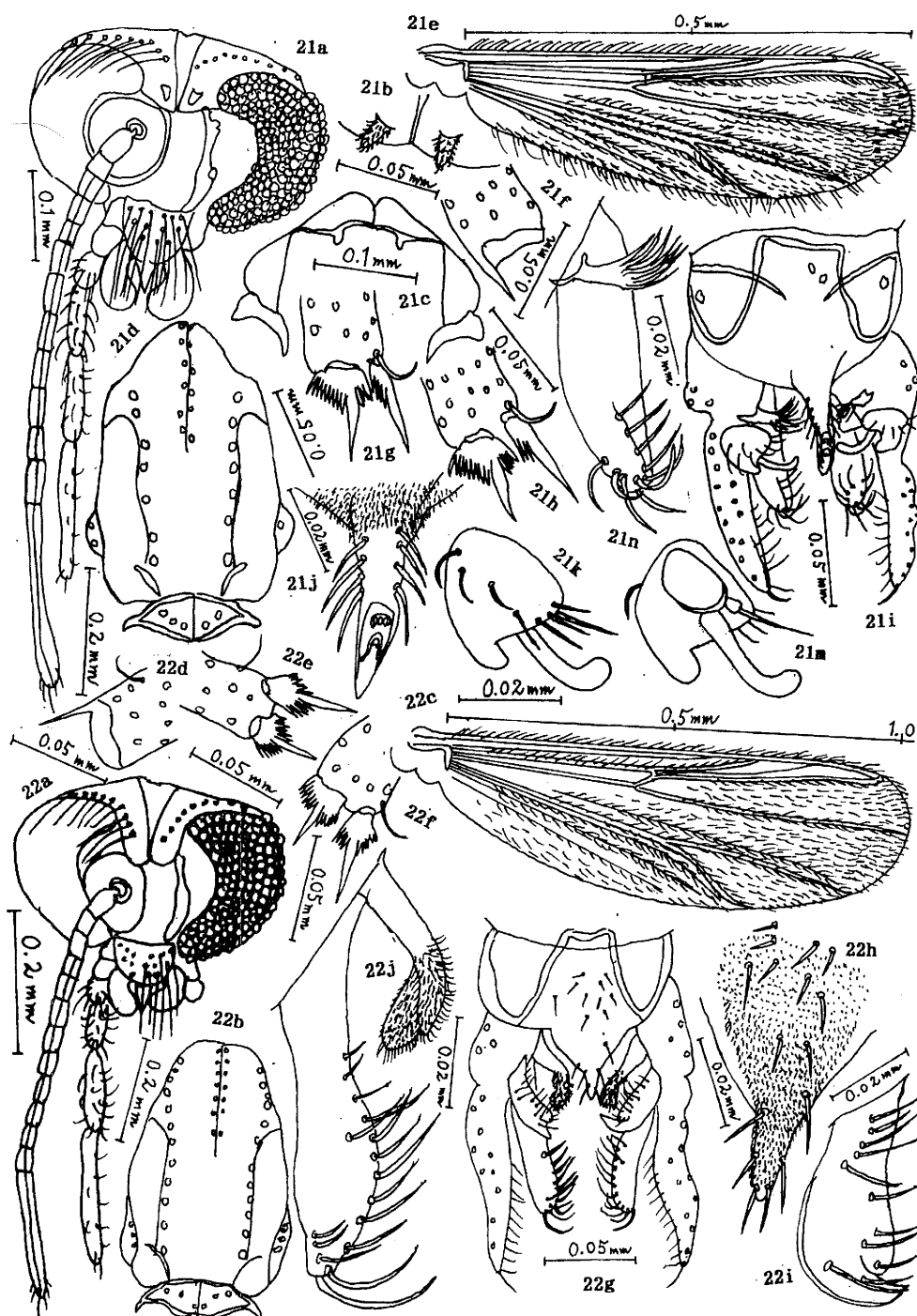


Plate X. Fig. 21. *Tanytarsus iriolemeus* sp. nov.

Fig. 22. *Tanytarsus iriomeneus* sp. nov.

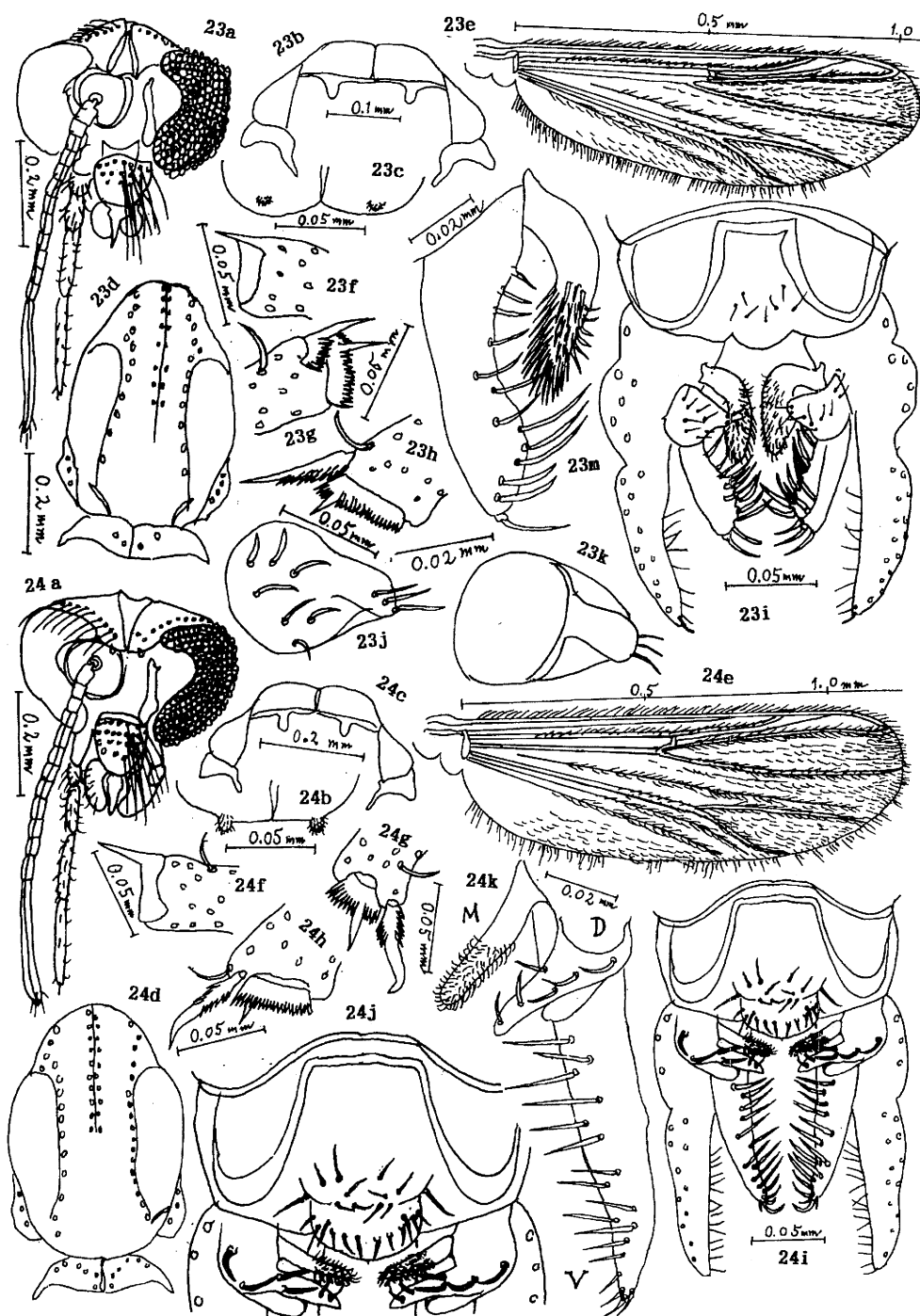


Plate XI. Fig. 23. *Tanytarsus irioneus* sp. nov.

Fig. 24. *Tanytarsus iriopeus* sp. nov.

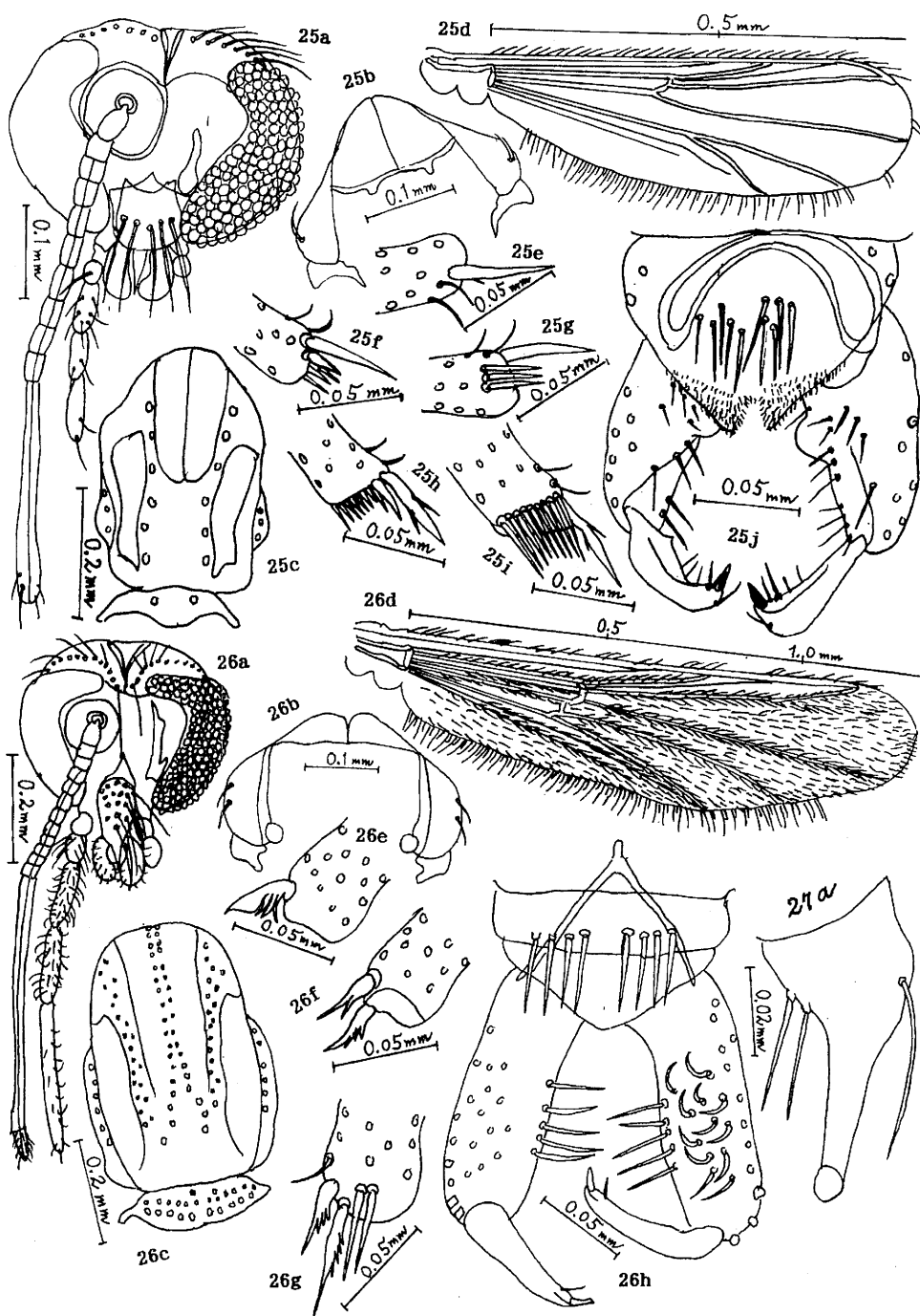


Plate XII. Fig. 25. *Limnophyes iriopequeus* sp. nov.

Fig. 26. *Yaequintus irioquereus* gen. et sp. nov.

Fig. 27. *Pentapedilum benokiense* Sasa et Hasegawa, 1988